

SEP 28 1930

QST

DEVOTED ENTIRELY TO

AMATEUR RADIO

PUBLISHED SINCE 1915 BY THE AMERICAN RADIO RELAY LEAGUE INC.



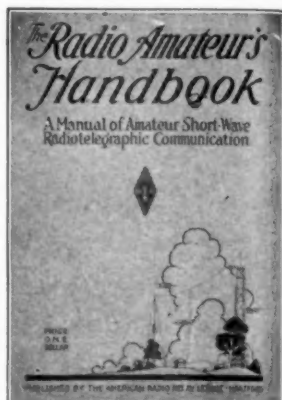
OCTOBER, 1930

25¢

FALL IS HERE!

*Rebuilding Time—"The Season to
Get the Old Station Overhauled
for a Fine Winter's Work."*

Cooler days and autumn foliage remind us that crystal nights of DX are just around the corner. Now is the chance to put the new ideas of 1930 on the air in your station. Whether you're rebuilding or a new man just breaking into the game, you need as your constant companion and mentor



The RADIO AMATEUR'S HANDBOOK

By *HANDY and HULL*

Now in its 84th thousand

This book is a publication of the American Radio Relay League, the amateur's own organization, written by amateurs for amateurs. It is hailed everywhere as the greatest help that an amateur ever saw. ¶ Because it starts in at the very beginning of the story and tells what amateur radio is, how to become an amateur, how to learn the code, and how to operate a simple station, it is an invaluable and a sympathetic guide for the beginner. ¶ Because it progresses through working descriptions and building instructions for many varieties of receivers, transmitters, power supplies and antennas, and because it goes into all the intricacies of station operation and message handling, it is an indispensable necessity for the proficient amateur.

A world of valuable information, printed in "QST" format and bound in durable paper covers so that the price may be modest.

Blue-and-Gold Paper Cover, \$1.00

Stiff Buckram Binding, \$2.00

◀ We honestly don't see how you can get along
without the Handbook. Order yours today! ▶

AMERICAN RADIO RELAY LEAGUE

HARTFORD, CONN., U. S. A.



QST



The Official Organ of the A.R.R.L.

VOLUME XIV

OCTOBER, 1930

NUMBER 10

Editorials	7
The Dynatron Frequency Meter	George Grammer 9
The President's Corner	Hiram Percy Maxim 20
A Multi-Range Receiver With Four Tuned Circuits	Robert S. Kruse 21
High-Frequency Notes	Clark C. Rodimon 26
How Our Signals Look	Paul E. Griffith, W9DBW 27
Neutralizing Radio-Frequency Amplifiers	Robert T. Foreman, W9ZZE 31
Election Notice	34
Preparing an Article for QST	James J. Lamb 35
Doings at Headquarters	37
Standard Frequency System News	38
Experimenters' Section	39
Tuned Antennas for Receiving, Single-Wire-Fed Hertz, An A. C. Combination Receiver, The Space-Charge '22 Detector, Filament By-pass Condensers, A Useful Lamp Bank, Line Pad for Remote Control, Winding Form for Copper Tubing, Lead-In Insulators, A Simple Primary Reactor	
Huber Resigns	44
W7GP	45
I.A.R.U. News	49
Calls Heard	51
Correspondence Department	52
Silent Keys	76
West Gulf Division Convention (Announcement)	80
Pacific Division Convention (Announcement)	82
Financial Statement	84
Book Reviews	84
Hamads and QRA's	92
QST's Index to Advertisers	94

QST is published monthly by The American Radio Relay League, Inc., at Hartford, Conn., U. S. A.
Official Organ of the A.R.R.L. and the International Amateur Radio Union

Kenneth B. Warner (Secretary, A.R.R.L.), Editor-in-Chief and Business Manager

James J. Lamb
Technical Editor

George Grammer
Assistant Technical Editor

Clark C. Rodimon
Managing Editor

David H. Houghton
Circulation Manager

G. Donald Meserve
Advertising Manager

Advertising Offices.....55 West 42d Street, New York City
Editorial Offices.....1711 Park Street, Hartford

Subscription rate in United States and Possessions, Canada, and all countries in the American Postal Union, \$2.50 per year, postpaid. Single copies, 25 cents. Foreign countries not in American Postal Union, \$3.00 per year, postpaid. Remittances should be by international postal or express money order or bank draft negotiable in the U. S. and for an equivalent amount in U. S. funds.

Entered as second-class matter May 29, 1919, at the post office at Hartford, Connecticut, under the Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in section 1103, Act of October 3, 1917, authorized September 9, 1922. Additional entry at Concord, N. H., authorized February 21, 1929, under the Act of February 28, 1925.

Copyright 1930 by the American Radio Relay League, Inc. Title registered at United States Patent Office.

BYRD'S Antarctic Radio Equipment

The advanced types of receivers, transmitters, and navigation aids that triumphed on this epochal flight now fully described in this book.

TELEVISION

Mr. C. F. Jenkins, father of television and radio movies, gives you in his own words complete directions for building practical television equipment.

INTERFERENCE ELIMINATION

Tracking down troublesome interference and eliminating it, systematically outlined by W. F. Fleming, radio engineer.

RADIO AUTO-ALARM

New automatic device on ships to keep the SOS watch while operator is off duty—fully described in this book.

Latest BROADCASTING Equipment

Temperature-controlled Piezo crystal oscillator, 100% modulation panel, and other new apparatus, completely described, with instructions for operation.

SHORT-WAVE Apparatus

Latest types of commercial and amateur short-wave apparatus; directions for securing operator's and station license.

MARINE and AERIAL Radio Equipment

Radio beacons; arc radio transmitter for ships; Reed course indicator; latest developments in high frequency transmitters.

New RADIO LAWS and REGULATIONS

New regulations governing all classes of operators' licenses, U. S. Laws, and I. R. T. C. laws.

New Developments!

Complete Instructions and Data on All Recent Radio Inventions Now Yours for Ready Reference in This One Big Guide Book of Radio

THE RADIO MANUAL

A Handbook for Students, Amateurs, Operators and Inspectors

Here's the answer to every question about the principles, operation and maintenance of apparatus for radio transmitting and receiving. No detail has been omitted, from elementary electricity and magnetism for the beginner to television and radio movies. Important new chapters have been

added to bring it right up-to-the-minute, and an immense volume of facts never before available is now presented in the book. Included are detailed descriptions of standard equipment, fully illustrated with photographs and diagrams. It is now more than ever the one complete handbook covering the entire radio field.

A Complete Course in Radio Operation IN ONE VOLUME Enables You to Qualify for Gov't License as Operator or Inspector 20 Big Chapters Cover:

Elementary Electricity and Magnetism; Motors and Generators; Storage Batteries and Charging Circuits; The Vacuum Tube; Circuits Employed in Vacuum Tube Transmitters; Modulating Systems and 100% Modulation; Wave-meters; Piezo-Electric Oscillators; Wave Traps; Marine Vacuum Tube Transmitters; Radio Broadcasting Equipment; Arc Transmitters; Spark Transmitters; Commercial Radio Receivers; Marconi Auto-Alarm; Radio Beacons and Direction Finders; Aircraft Radio Equipment; Practical Television and Radio-movies; Eliminating Radio Interference; Radio Laws and Regulations; Handling and Abstracting Traffic.

Prepared by Official Examining Officer

The author, G. E. Sterling, is Radio Inspector and Examining Officer, Radio Division, U. S. Dept. of Commerce. The book has been edited in detail by Robert S. Kruse, for five years Technical Editor of QST, the Magazine of the American Radio Relay League, now Radio Consultant. Many other experts assisted them.

Mail This Coupon Today!

D. Van Nostrand Co., Inc.
250 Fourth Avenue, New York

Send me the Revised edition of THE RADIO MANUAL for examination. Within ten days after receipt I will either return the volume or send you \$6.00, the price in full. (QST 10-30)

Name.....

St. and No.....

City and State.....

Business Connection.....

Examine it FREE!

The 1930 edition of "The Radio Manual" has just been published. Nearly 800 pages, 369 illustrations. Bound in Flexible Fabrikoid. The coupon brings the volume for free examination. If you do not agree that it is the best Radio book you have seen, return it and owe nothing. If you keep it, send the price of \$6.00 within ten days.

Say You Saw It in QST — It Identifies You and Helps QST

EDITORIALS

THERE'S some dirt in the air these days, fellows. Perhaps we shouldn't lend it the dignity that comes from mentioning it in *QST*'s pages. We've thought that over, though, and it seems to us that discussion of these problems is one of the prime functions of our magazine. Another reason is that the dust seems to have risen entirely over earlier statements in *QST*.

You've probably heard some of the talk yourself. Possibly you've already been informed that the policies of A.R.R.L. and its officers are killing amateur radio by leaps and bounds; that the new regulations are a serious blow; that the requirement of d.c. supply is forcing hundreds of stations out of the game; that A.R.R.L. accepts the dictation of the Federal Radio Commission, commercial corporations, and wealthy amateurs, as against the interests of the amateur generally; that the compulsory log consumes all an amateur's time in posting; that the League sponsored it either in order to be able to sell a new kind of log-sheet or as one more step in its plans to trap hams, for which its officers doubtless get a rake-off of so much a head from R.C.A.; that A.R.R.L. is trying to run 'phone off the air; that the first thing the fellows know their officers will have shoved down their throats a new regulation prohibiting everything except crystal-control; that Headquarters is trying to get the Government to cancel the temporary operator's certificate and confine licenses to those who can travel to the Supervisor's office for examination; that the League used to protect amateur radio but now only howls it down; that things would be better if *QST* would publish some information which would help amateurs instead of trying to kick them off the air. And more to the same general effect.

This, it seems, is what comes of efforts on our part to write "constructive" editorials. There is, of course, the small consolation that is to be derived from the thought that an inactive organization wouldn't get any letters. We could, we suppose, arrange to fill this monthly page with some variety of innocuous pap that would escape comment. We like to think that intelligent comment on League policies is a sign of vitality, of good health in the old organization. But amateur radio would be in for a hard time of it if any considerable percentage of its adherents had the view that their officials were unfaithful to them and, consciously or unconsciously, were selling

them out. We must conclude that somehow we have been failing, in recent months, to put across our thoughts in an understandable way. Criticism of our operating practices, inside our family pages, takes on the complexion of persecution; suggestions for station improvement, intended to be helpful, are taken as high-handed attempts to dictate an impossible standard; explanations of why the Board considered something wise are considered an endeavor to sell our personal views. Let us try once more to unsnarl the haywire:

PRIOR to 1923 this League had the "benevolent-autocracy" form of government. It had a hand-picked Board of Directors. They did their work well but they were all "directors at large," they always got returned to office, and those who attended meetings were all in the East. The system was properly criticized and in 1923 the League adopted the present system of one director per division, elected every two years by the membership of the divisions. Now we have democratic government, and with it, we presume, some of the insufficiencies of democracy. One of these is the lack of any adequate way of satisfying minorities who, having representation, expect to have their way about things and don't get it in the face of an opposed majority. Temporary acceptance of such things is supposed to be an essential in the workings of a democracy, but most of us in amateur radio are still young and impetuous, and it's hard to have a pet notion voted down. We're told, though, that the experience of the world shows the representative form of government, with rule by majority vote, to be the best that man has devised; the only workable alternative is absolute dictatorship and that isn't acceptable in America.

Our Board of Directors has a constitutional right to make policies and give orders. What it says goes. Headquarters doesn't decide these things; the headquarters officers obey their orders. I, Warner, do not "run the League." The Board decides what it's to do about a certain subject by taking a vote. If there's any division of opinion at all, somebody gets left out in the cold, his views do not get accepted. This is an unavoidable process in the workings of democracy. The idea itself is fundamentally sound. If you don't like a League policy, you should write to your director about it — the directors are the ones who decide such things and your director is your representative. If you, meaning the general membership, don't like your directors,

don't like the things they do, don't like the way they respond to your suggestions, change your directors at the next election. If you can't change them it's because you're a minority and most people don't share your view — in which case you're not entitled to prevail. If your views are sound, the majority will agree with you and there will be changes. Then if the directors don't like the officers they can fire them at will. If the directors believe the officers are inefficient or disloyal, they jolly well will fire them. If the officers don't do what the directors tell them to do, they'll be fired. There is a chain of responsibility. What the officers do is what the majority of the amateurs of the country told their directors they wanted to have done. If you didn't have your way about something it's because the vote was against your point of view when the Board balloted to find its decision, on the principle of the greatest good to the greatest number.

TIMES change, naturally. Changing conditions bring their new problems. Radio in all its manifestations is a seething cauldron all over the world, in the pains of readjustment made necessary by great expansion and intolerable crowding. Every branch of radio is yelling its head off about the injustices it is suffering. Every phase of radio finds it necessary to acclimate itself to new surroundings. Amateur radio is no exception. The changes which have confronted us the past three years have been profound. Like the rest of the radio world, we are obliged to move faster than we wish. Hundreds of new problems arise to be solved. In A.R.R.L. they go before our Board of Directors for solution. Most of them are sticklers; some of them are heart-breakers. What to do about frequency observance, frequency measurement, stability, rights of amateurs; what to do about 'phone, quiet hours, portables, alien operation; what about Madrid preparation, international publicity; what about the cost of improvements made necessary by any change in regulations. Now ask yourself what the ideal way would be to settle upon an A.R.R.L. program in these difficulties. You'd take a vote of the amateurs, wouldn't you, and the majority would win. Just that is provided for in the existing scheme. Amateurs tell their directors, the directors tell the Board. There may be division, in which case the majority rules; the instructions go down the line accordingly to the officers. Fundamentally, it seems to us, the scheme is sound. Conflicting groups can't both have their way. Hundreds of new decisions have had to be made and unfortunately some toes have been stepped on, some pet ideas left by the roadside.

We believe that an overwhelming majority of the active amateurs of the country favor the Board's present policies with respect to frequency observance, d.c. plate supplies, 'phone regula-

tions, and station logs. We believe these amateurs back up the League in its decisions to oppose any compulsory specification of crystal-control and to oppose any abandonment of the temporary operator's certificate. Perhaps you know quite a few amateurs around you who agree with you in opposing some existing Board decision. In fact, although we doubt it, it may be that the majority of members in some whole division is opposed to some particular policy. Perhaps your director is too, in which case he probably voted against it. But A.R.R.L. is national in scope, as it must be, and again the only feasible way to settle such questions is by vote of the majority. If these decisions, or any other League decisions, do not truly express the wishes of the majority of our members, then they will not endure — they will be changed speedily *via* the existing constitutional methods within the League. Until it is demonstrated that they are not what amateurs generally wish, disappointed minorities should endeavor to submerge their grief in the realization that the majority must rule in such an organization as ours.

ONE of QST's duties is to interpret the ever-changing radio picture. Included in this is the endeavor to interpret the actions of the Board of Directors, to explain the reasons behind the decisions so that the necessity may be apparent, the fairness evident. They are not the decisions of the QST staff or of A.R.R.L. Headquarters, and it doesn't even matter whether the officers personally agree with the decisions or not — they're orders. With changing conditions, we have new problems and must devise new ways to deal with them. Change is not necessarily progress, but progress requires change, and as we climb amongst our difficulties it has been inevitable that there were many changes, hateful to those who oppose change, distressing to those to whom change was difficult — but all of them necessary if we were not to stagnate and lose our place in the sun. QST has tried hard to explain these things too, the line of reasoning that showed them to be desirable, and the solutions that were available. QST is supposed to be helpful, not a medium for the hollow parroting of what everyone already knows, but a forum in which "we, the people of the A.R.R.L.," may discuss our difficulties, find joy in our achievements, help each other, and enjoy each other's company. Your officers and your editors are expected to be leaders, to study conditions in our art, to know what is what and how to talk about it, and then they're supposed to exert some leadership by mentioning what they find out and suggesting what might be done about it. This isn't persecution any more than the Board's plans for necessary improvements are persecution. These are the inevitable changes of progress.

(Continued on page 25)

The Dynatron Frequency Meter

How to Build, Calibrate and Use It

By George Grammer, Assistant Technical Editor

This article contains intensely practical information on the latest type of frequency meter, and should be read by every amateur whether he intends building one or not. Much of the data on frequency-meter design and calibration is applicable to other heterodyne frequency meters as well as to the dynatron type. — EDITOR.

IN September QST the good and bad points of various types of frequency-measuring devices were discussed, and the advantages of the dynatron oscillator as a heterodyne frequency meter were pointed out.¹ In order to avoid needless repetition we will not go over the same ground again in this story, but will simply tabulate the three major conclusions reached:

1. A heterodyne frequency meter is far superior to an absorption frequency meter as used by most amateurs.

2. A dynatron oscillator is better than an ordinary feed-back oscillator for use in a heterodyne frequency meter.

3. With a heterodyne frequency meter using a dynatron oscillator it is entirely possible and practical to attain an accuracy in frequency measurement within one-tenth of one percent or better if the meter is calibrated from A.R.R.L. Standard Frequency Transmissions, and such accuracy is by no means the ultimate.

Deciding on the heterodyne frequency meter with a dynatron oscillator as the best practical combination for precise work is by no means the end of the story, however. Oscillator stability, even though of utmost importance, is only one of the factors which necessarily influence frequency-meter-design. The object in view is accurate measurement of frequency, and every factor which affects the measurement must be taken into account, from the accuracy of the signals by which the meter is calibrated to the errors which may be introduced by the person making measurements with the calibrated meter, and including all the intermediate steps.

The accuracy of standard frequency signals is within 0.01% of the frequency announced at the time of transmission. Taking this as a basis, further errors can be safely considered to be entirely dependent upon the construction of the frequency meter and the manipulation of it by its owner. These errors may be divided into five general classes, as follows:

1. Errors in adjusting the meter to synchronism with standard frequency signals.

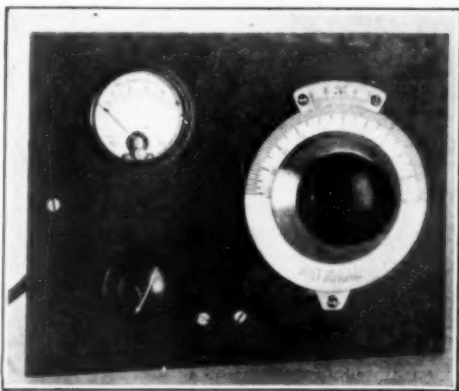
2. Errors in reading the dial settings during calibration and inaccuracies in curve plotting and interpolation.

3. Shifting of the oscillator frequency from any cause.

4. Error in adjusting the meter to synchronism with the signal whose frequency is to be measured.

5. Errors in reading dial settings and in reading the frequency from the calibration curve.

Nos. 1 and 4 are unlikely to cause any serious trouble since almost any operator can set an



THE FRONT PANEL

On it are the tuning dial, the milliammeter for measuring space current, and the filament rheostat.

oscillator to zero beat with an incoming signal and be not more than a few cycles off true zero.

No. 3 is entirely a function of the suitability of the oscillator for frequency meter work and the mechanical construction of the meter. The dynatron oscillator meets the requirements nicely, as has been explained previously, and good mechanical construction is not difficult. When the total space current taken by a dynatron oscillator—as read by the milliammeter connected in the negative “B” lead—is maintained at

¹“Bringing Frequency Measurement Up to Date,” QST, September, 1930.

a constant value the effects of battery decay, aging of the tube and variations in grid bias are made negligible. The negative resistance—the only dynamic tube characteristic which can affect calibration—is practically constant in spite of such changes so long as the space current is constant. We therefore have a visual indication of the conditions in the tube, and by keeping the space current at the same value as during calibration can be sure that no changes have occurred which are attributable to the tube or batteries.

With a stable oscillator Nos. 2 and 5 are in the majority of cases more serious than No. 3, al-

This very uncertainty is one of the chief reasons why the heterodyne frequency meter is so far superior to the absorption meter for amateur work; personal errors have less chance to effect the accuracy of measurement.

GOOD CONSTRUCTION

With any frequency meter it is highly important that the chances of loss of calibration be reduced to a minimum. This makes necessary the use of well-built coils and condensers and rigid construction throughout. Continual handling of any part of the meter which can affect the calibration should be avoided. Plug-in coils are particularly bad in this respect, since it is almost impossible to prevent mechanical shocks to them by bumping or dropping them, and it is always necessary to be sure they are fitted into the sockets in just the same way as when calibrated.

Coil troubles may be avoided with the dynatron frequency meter since it is possible to use but one coil and condenser and calibrate the meter on the lowest frequency band to be covered, using harmonics for the higher frequency bands. There is an additional advantage to this, because the meter will hold calibration better at the lower frequencies and this will increase the accuracy at the higher frequencies as well, since the percentage change in oscillator frequency will be the same on the harmonics as on the fundamental.

For amateur work as carried on to-day the best system is to cover the 3500-kc. band with the frequency meter and use the second and fourth harmonics for the 7000- and 14,000-kc. bands respectively. These harmonics will usually be present in sufficient strength to be used easily and higher ones may be emphasized by special means if necessary. The 3500-kc. band is about the highest that can be successfully used with a maximum of tube life and a minimum of battery consumption with available tubes which will function as dynatron oscillators. Even if the transmitter is not used on 3500 kc. it is a simple matter to listen on that band for picking up standard-frequency signals for calibration purposes although even this is not entirely necessary, as will be explained later.

REDUCING THE PERSONAL ERROR

The selection of the 3500-kc. band for the oscillator automatically limits the tuning range to a little over 500 kc. since it is desirable to spread the band over the dial scale as much as possible. Too much band spreading should be avoided, however, since the calibration is least likely to hold at the ends of the scale. Lopping off fifteen divisions (100-division dial) at each end will be sufficient, and will leave 70 useful divisions over which the band is to be spread. Assuming the tuning condenser to have a straight curve of frequency vs. dial reading, each scale division

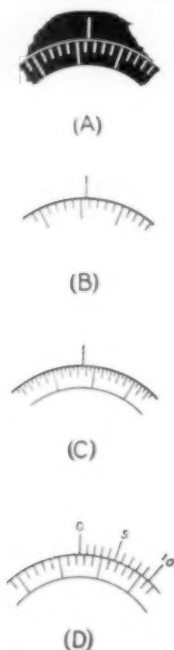


FIG. 1. — DIALS

The bakelite dial depicted at "A" is very poor for precision reading. The indicator and dial markings are too thick for accurate reading even if there is no parallax, which is always bad with this type of dial. In "B" is a better form of dial, the markings and indicator being thin lines. If the dial is metal with engraved markings fair readings can be taken, although quite a bit of estimating is required. "C" is much better, even though the mechanical construction is the same, because the half-division marker makes close estimating of fractional divisions easier than in "B." The vernier arrangement shown in "D" is best of all, providing the dial and vernier markings are accurately made. In all these arrangements the effect of parallax is not taken into account, but must be considered in practice, since the accuracy will not be as high if parallax cannot be avoided.

though very rarely receiving much consideration in amateur frequency-meter design. The oscillator itself can do none of the actual work of measuring, and here, as in the case of the absorption meter, is where the human element—a most uncertain factor—enters the picture.

will represent a little more than 7 kilocycles. Obviously it must be possible to read the dial to less than one scale division, because 7 kilocycles represents 0.2% at 3500 kc., and is twice the total error — from calibration to measurement — which should be allowed.

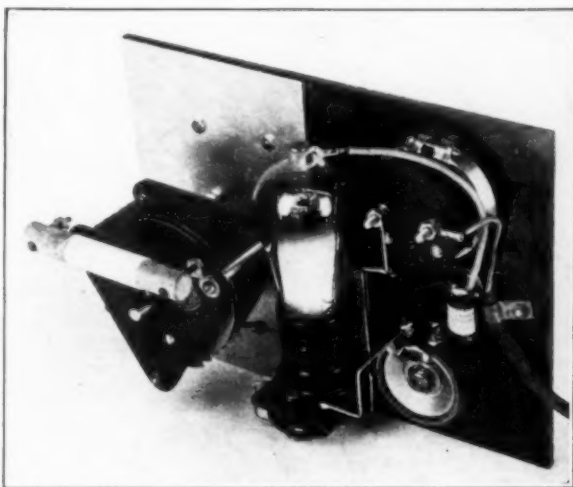
It was pointed out in September *QST* that a good dynatron oscillator could be expected to hold calibration within 1500 cycles at 3500 kc. under reasonable conditions. This figure can be bettered considerably if certain precautions in operation are taken, but is nevertheless a good one to use for the present calculation. It is desirable that the final frequency measurements made with the meter be within 0.1% of the actual frequency, which at 3500 kc. is 3500 cycles (3.5 kc.). Standard Frequency Transmissions represent a possible error of 350 cycles at the same frequency. The oscillator and calibration source therefore make up a total of 1850 out of a maximum allowable error of 3500 cycles, leaving not more than 1650 cycles for all other errors.

Personal error is greatest when the amount of estimating required is largest. Nearly all of us can estimate accurately to a quarter of a dial division if the dial is a good one with fine lines — such as the so-called vernier dials with printed paper scales — and if the indicator is also a fine line with negligible parallax.² Bakelite dials with filled-in lines are very poor because the line itself spreads over about a quarter of the division, and the indicators which can be used with such dials are rarely satisfactory.

If the dial is constructed with readability in mind; i.e., fine-line divisions, fine-line indicator, and negligible parallax, and each division is also supplied with a half-division marker, it is possible to easily read it to a quarter of a division and tenths can be estimated well enough to make accurate readings to a fifth of a division possible. A fifth of a division is 1400 cycles on the basis discussed above, and slightly less than the 1650 cycles allowable if the accuracy is to be within 0.1%. If it were possible to read accurately to a tenth of a division errors from this source would be reduced just that much more. If the error in frequency measurement is to be less than 0.1% the dial must be such that it can be read to a tenth or less of a scale division, or the tuning must be restricted to a smaller portion of the band so that each dial division represents a smaller percentage of the frequency.

² Parallax is the apparent difference in readings obtained when the dial is viewed from different angles. It is negligible when the indicator and dial are in the same plane, and becomes worse as the two are farther apart.

To meet the requirements outlined above, the dial must be at least four inches in diameter, and the larger it is the better will be the precision in reading it. The General Radio dial shown in the photograph (p. 17) is a good one. The scale has 200 divisions, numbered to 100, and the indicator rides on the edge of the dial, eliminating parallax. The four-inch National dial shown in the photographs



THE FREQUENCY-METER LAYOUT

The tuning condenser is at the left, mounted behind the aluminum shield to prevent body-capacity effects. The coil is mounted directly on the condenser terminals. The screen-grid by-pass condenser is under the shelf holding the tube, and the plate by-pass condenser is between the tube and the panel. The fixed resistor is held in place by the wiring, and is located between the milliammeter and the rheostat.

of the experimental frequency meter is also well suited to this work, and is supplied with a vernier for reading to a tenth of a scale division. The vernier scale is mounted above the dial because of the mechanical difficulty of building such a dial with the two scales in the same plane, and some parallax may be introduced unless care is used. The dial can be read accurately to at least a fifth of a division, however, in spite of this. The 6" National dial is the best of all if real precision in readings is wanted, and is so constructed that it can be read very accurately to a tenth of a division, and twentieths may be estimated. With this dial working under the conditions named previously (500-kc. spread over 70 divisions) it is possible to estimate accurately to within 350 cycles at 3500 kc., or 0.01%.

Since there are many amateurs who work only in the 7000- or 14,000-kc. bands, the dial problem can be simplified considerably if the frequency meter is made to cover 3500 to 3650 kc. over 70 divisions of the scale. In such a case there are only a little more than 2 kilocycles per division, and the required accuracy can be obtained without difficulty with a reasonably good dial.

The usefulness of the meter in the 3500-kc. band is restricted, of course. It is not advisable to attempt to run the oscillator on 7000 kc. directly because available tubes do not always oscillate well at such high frequencies.

PRACTICAL CONSTRUCTION

With a thorough understanding of the points discussed above it is possible to proceed to the

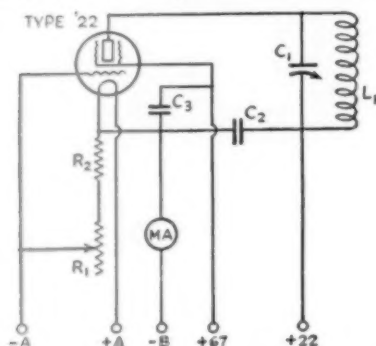


FIG. 2.—DYNATRON FREQUENCY-METER CIRCUIT

C_1 —Variable condenser of good construction, preferably with a small amount of "tank" capacity. The size of the condenser must be adjusted to spread the 3500-kc. band over the dial. The one in the photograph is a General Radio Type 857.

C_2 —0.5 μ fd. or larger.

C_3 —0.005 μ fd. or larger.

L_1 —75 turns of No. 30 d.c.c. wire on $\frac{1}{2}$ -inch form, no spacing between turns.

R_1 —60-ohm rheostat.

R_2 —15 ohms.

MA—0-10 milliammeter.

This circuit is satisfactory for tubes with oxide-coated filaments but should not be used with thoriated-filament tubes. Fig. 4 should be employed for the latter. Separate "A" supplies must be used on the frequency meter and receiver.

construction of a frequency meter which will embody the suggestions which have been made. Such a meter, using a Type '22 tube as a dynatron oscillator, is shown in two of the photographs. The reasons for using a Type '22 tube were explained in September QST and need not be repeated here. There is an additional advantage over the Type '24, however, because the "A" and "B" battery power consumption is lower.

The heterodyne frequency meter differs from the monitor in that it is not intended to be used as a receiving device, but simply as a miniature transmitter. Therefore no provision is made for the insertion of phones in any part of the circuit. There is likewise no necessity for thorough shielding of the oscillator and batteries, as is the case with the monitor. In fact, the same batteries which supply "B" power to the receiver may be used to supply the frequency meter also, unless it is desired to have the complete set-up portable, which is not advisable for ordinary station use. On the other hand, there is no need for direct coupling between the frequency meter and re-

ceiver for satisfactory pick-up. Such coupling is likely to affect the calibration, and for harmonics up to the fourth, at least, is not necessary. If common "B" batteries are used for both receiver and frequency meter enough coupling will be provided. The frequency meter therefore need not be shielded if it is placed in a suitable location on the operating table and left there permanently, with no material near it which can affect the calibration. Shielding is sometimes helpful if the frequency meter must be located close to other pieces of equipment, however. The question is largely one for the individual constructor to decide. To be on the safe side it may be better to use shielding than not.

The wiring diagram for the frequency meter shown in the photographs appears in Fig. 2. This arrangement is quite compact and all the parts are supported by the panel. The leads between the tuned circuit and the tube are short—a desirable feature. The panel is bakelite, 7 x 10 inches, and on it are mounted the tuning condenser, the milliammeter for reading the total space current, and the filament rheostat. The tube socket is mounted on a piece of bakelite which is supported from the panel by two small brass angle pieces. This mounting also holds the by-pass condensers for the plate and screen-grid circuits. The fixed resistor, R_2 , is used only if the tube filament supply is a 6-volt battery, and prevents the application of too much voltage to the filament. It may be omitted with a 4-volt supply.

The tuning condenser is mounted behind an aluminum shield to prevent body-capacity effects, since the condenser has no shielding end-plates. The coil, L_1 , is mounted directly on the condenser, and is wound with No. 30 d.c.c. wire on a half-inch dowel. Both dowel and coil are coated with airplane "dope." In spite of the fact that a coil of this shape has a very poor form factor, it was found that the tube would oscillate more readily with it than with some others of supposedly lower r.f. losses. A coil of such small diameter has a rather small field, and the calibration of the meter is less likely to be changed when other objects are placed near it. The number of turns specified may vary slightly with individual constructors, and it should be remembered that the object is to spread the 3500-kc. band over about 70 divisions on the tuning dial. To do this it will be necessary to readjust the fixed plates at the back of the tuning condenser as well as experiment with the coil, until the desired spread is obtained. With the number of turns specified, the two circular rotor plates should be moved toward the stationary plate between them until the spacing is roughly a sixteenth of an inch.

If the constructor prefers a different layout it should be remembered that leads in the coil-condenser circuit should be short, and that the lead from the plate of the tube to the tank circuit and

those connecting the tank circuit through the by-pass condenser to the filament should likewise be short. At the same time, however, the coil, condenser and tube should be so placed as to be out of each others' fields as much as possible.

The capacity values for the by-pass condensers are not critical, but should be fairly large to prevent hand-capacity effects at the battery leads and the tuning dial. The larger the plate by-pass condenser is made the less will be the hand capacity during tuning. A half- or one-microfarad condenser is sufficient.

In the previous article the desirability of having a small amount of fixed capacity in the tuned circuit was pointed out. The General Radio condenser illustrated is ideal from this standpoint, the two circular plates supplying a fixed capacity which is easily adjustable within sufficiently wide limits. The only objection to this model is that the operator's hand is not shielded from the stationary plates. It is probable that a new condenser of the same general type but with metal end-plates will be marketed shortly, in which case the shield on the panel would be unnecessary. Other condensers without the fixed-capacity feature may be used, of course, either with or without an external fixed condenser to supply it. Be sure to select one that is solidly built and which has wide spacing between plates — and good bearings — or the calibration of the meter is likely to change.

The desirability of a comparatively low L/C ratio (High-C) is illustrated by the curves in Fig. 3. Both curves were taken with the dynatron oscillator beating against a crystal-controlled oscillator, and in each case the dynatron tube was "cold" when the run was started. In Curve I the L/C ratio in the dynatron tuned circuit was about the same as would be used in a receiver designed to spread the 3500-kc. band over most of the dial. In Curve II the L/C ratio was approximately that used in the frequency meter shown in the photographs. The change in frequency is noticeably less with the lower L/C ratio, illustrating the point that the capacity between the tube elements changes as the tube temperature rises, and also emphasizing the fact that such variations in capacity can be "washed out" if the external capacity across the tube elements is made comparatively large.

If a separate fixed condenser is to be used in parallel with the tuning condenser it should preferably be an air condenser with low dielectric losses, since the '22 will not oscillate as a dynatron if the losses become too large. The capacity necessary will be in the vicinity of 50 μfd . although the exact value will depend on the minimum capacity of the tuning condenser being used. A low-loss midget condenser should be satisfactory, provided the plates can be locked in position by some means or other after the correct setting has been determined.

After the frequency meter has been constructed it should be connected up, using the same "B" batteries as are used on the receiver, and tested for oscillation. A separate "A" supply should be used; otherwise the milliammeter will give no indication. Listen in on the 3500-kc. band and turn the dial on the meter. If it is working at all there will be no difficulty in hearing it — most of the time the signal is R9 plus. If there is no sign of oscillation check all connections carefully and make sure there is nothing in the field of either the coil or the condenser to cause losses. It may be that the dynatron is oscillating at some frequency outside the range of the receiver, al-

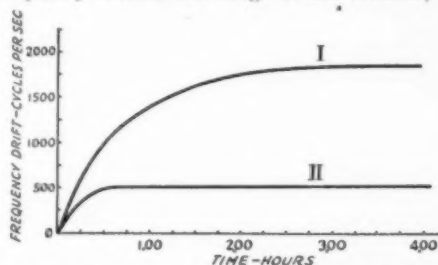


FIG. 3. — EFFECT OF L/C RATIO ON FREQUENCY DRIFT

These curves were obtained by adjusting the dynatron oscillator to zero beat with a crystal oscillator and taking readings of drift every fifteen minutes. In Curve I the capacity was very small and the inductance large — about the same ratio as is commonly used in receivers. In Curve II the L/C ratio was about that used in the final frequency meter. The introduction of a small fixed capacity across the condenser reduces the drift considerably.

though this should not happen if the specifications given in Fig. 2 are followed carefully. If the tube is oscillating the milliammeter will show a deflection when a finger is touched to the plate terminal or the stationary plates of the condenser. It may be that the tube is a "dud," in which case the only thing to do is try another one.

In the diagrams the plate voltage indicated is 22 volts and the screen-grid voltage 67 volts. It is well to operate the tube at these voltages, but if the oscillations are too weak or there is no oscillation at all, 45 volts on the plate and 90 volts on the screen-grid will result in greater output.

While on the subject of tubes it is well to remember that the dynatron characteristics of individual tubes vary greatly. Some fifteen different d.c. screen-grid tubes (including both Type '22 and Type '32 and also the DeForest 422-A) of various makes were tested in the frequency meter illustrated and every one of them oscillated, but the amount of space current required for oscillation was different in almost every case, varying anywhere from 2.5 to 9.5 milliamperes. Obviously the tubes taking the lower currents are less likely to be deactivated in a short time, and it is important that the space current be kept at the lowest value which will give the desired results if the tube is to have long life.

In using tubes with thoriated filaments (the ones which light up rather brightly as contrasted with the dull red of the oxide-coated filament) it is a good plan to operate the filament at the rated voltage rather than above or below it. When using the filament rheostat to control space current, as in Fig. 2, the actual voltage on the filament is often 25% or more below the rated value. The space current, on the other hand, is likely to be somewhat greater than the rated plate-plus-screen-grid current for the tube. This may result in rapid deactivation because the thorium is torn off the surface of the filament more rapidly than it is boiled out from inside. To remedy this condition the filament should be operated at rated voltage and the space current

little from that of the d.c. model, the only difference being in the heater and cathode wiring. The wiring diagram appears in Fig. 5.

With the '24 the grid-bias method of controlling space current is preferred to regulating the filament temperature because of the time lag with filament regulation. A rheostat may be inserted in one of the heater leads, but close adjustment of space current by this means is difficult because the temperature of the cathode thimble—and hence the cathode emission—changes very slowly. Variation of grid bias, however, gives quick and positive control of space current.

The construction of the oscillating circuit is just the same as with the frequency meter using the Type '22 tube. The filament of the '24 may be run from either a.c. or d.c., preferably the latter, because some tubes will be hummy with a.c. supply. The hum is the result of varying grid voltage, and since the grid voltage controls the negative resistance of the tube and consequently affects the frequency of oscillation, a sort of wobble results. Many tubes are entirely free from hum, however, and are entirely satisfactory with a.c. filament supply. Batteries should always be used on the plate and screen grid.

The '24 tube requires a greater length of time to reach a stable operating temperature, and the tube-capacity change is somewhat greater than with the '22. The '24 should always be allowed to warm up about a half hour before calibration or before making measurements intended to be accurate. The change in frequency at the end of the half hour will be between 2000 and 3000 cycles from the "cold" value, but after that time is not large enough to affect the performance of the meter unless the accuracy desired is more than 0.1%. If this precaution is observed the Type '24 is equally as good as the '22.

HOW TO USE THE FREQUENCY METER

Before going farther, let's get one point straight—the heterodyne frequency meter is not to be thought of as just a glorified monitor. It is not; and there is no provision in it for phones. It is intended to be used *with* the receiver and monitor; with the receiver for calibration and measurement of frequency of incoming signals, and with the monitor for measurement of our own transmitter frequency. In certain cases, the dynatron frequency-meter may be used as a monitor if the phones are inserted in the screen-grid lead, and if this is done the by-pass condenser from screen-grid to filament, or from screen-grid to cathode, should be made small enough so that it will not by-pass too much audio frequency—2000 $\mu\text{fd.}$ or less. In this case, however, listening must be done on a harmonic of the frequency meter or else the frequency meter and its batteries must be shielded after the usual

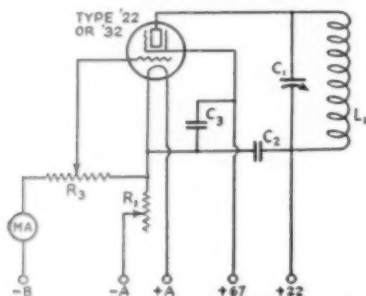


FIG. 4. — ALTERNATIVE FREQUENCY-METER CIRCUIT

This diagram should be used if the Type '22 tube incorporated in the meter has a thoriated filament, for reasons explained in the text. Constants are those of Fig. 2, with the addition of R_3 , which is a 2000-ohm potentiometer. Space current is controlled by the potentiometer instead of the filament rheostat. The "A" supply must be separated from that used for the receiver.

controlled by other means. This may be readily accomplished by using the circuit shown in Fig. 4. The "B" current flowing through the 2000-ohm resistor causes a voltage drop which may be used as bias for the control grid, the value of bias being regulated by the movable contact. This voltage-divider allows smooth adjustment of space current within rather wide limits.

This frequency-meter, although only an experimental model, performed well enough to justify all the nice things that have been said about the dynatron oscillator. Starting with the tube cold, the total change in frequency while the tube warmed up over a period of about two hours was less than 800 cycles.

DYNATRON METER WITH TYPE '24 TUBE

While the '22 seems to be the more satisfactory oscillator for frequency-meter use, many amateurs will prefer to use the '24 because of its greater availability, lower cost, longer life, and the advantages of a.c. filament operation. In addition, no separate "A" supply is necessary, since the cathode is insulated from the filament. The construction of such a meter differs very

fashion of monitors. The frequency meter must likewise be calibrated with the phones—or a resistance equal to that of the phones—in circuit, or the calibration will be “off.”

It is best to separate the functions of monitor and frequency meter, though, and we will proceed on that basis for the moment. The meter is supposed to be oscillating satisfactorily by this time, and a good signal from it can be heard on the receiver on the 3500-kc. band. At this time the strength of the second and fourth harmonics should be checked, unless the builder is interested in the 3500-kc. band alone, which is not often the case. If the signal strength on 3500 kc. is about R8, for the sake of an example, it should be about R6 on 7000 kc. and about R4-5 on 14,000 kc. If the 14,000-kc. harmonic is not strong enough to suit, increase the space current until the audibility is satisfactory. Try to keep the current down (below 4 milliamperes if possible) to prolong the life of the tube. If the current gets too high, connect the screen-grid lead to the receiving antenna through a small condenser—10 to 25 μ fd. or so. This will usually give plenty of coupling, and may allow the use of lower space current. The condenser should be large enough to give good coupling, and yet not so large as to impair the strength of outside signals.

When satisfactory strength has been obtained on all the harmonics to be used, read the space current indicated by the milliammeter and jot it down somewhere where it won't get lost. This reading is your reference point, and the space current should always be adjusted to the same value thereafter whenever the meter is used.

Naturally the first step in making the meter of value after the constructional work has been finished is to calibrate it. The frequency coverage of the instrument should be adjusted first of all by tuning it to zero beat with “marker” signals picked up on the receiver. Such marker signals may be simply those from commercial stations working near the edges of the amateur bands, many of which can be picked up at various times of the day. The “Radio Amateur Call Book” lists practically all of the high-power commercial stations in order of frequency assignments, and is helpful for this preliminary work.

The marker stations need not be near the edges of the band which is fundamental for the frequency meter. The 3500-kc. limit may just as readily be found by tuning in a 7000-kc. signal on the receiver and adjusting the frequency meter so that its second harmonic is at zero beat with the incoming signal, in which case the frequency meter will be tuned to 3500 kc. A 14,000-kc. signal could be used equally well. For instance, two good stations to use are WIZ on 6965 kc. and NAA on 4015 kc. When the second harmonic of the frequency meter is tuned to WIZ the dynatron frequency is 3482.5 kc.—very near the low-frequency edge of the band. NAA would

of course be tuned in on the fundamental. Many other stations could be used in like manner. If the coil and condenser in the meter are adjusted to tune to WIZ at 10 and to NAA at 90 on the dial—assuming the dial is set so that increasing numbers mean increasing frequency, which is the only logical way to do it—the band-spreading is just about right. To make the dial read right the indicator should be at zero when the condenser plates are meshed.

With band-spread all set and the final working value of space current noted, the stage is set for calibration. A rough calibration can be obtained by picking up various marker stations as described above and translating their frequencies,

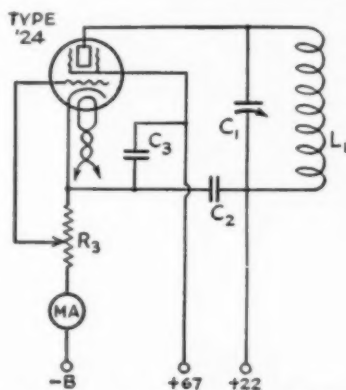


FIG. 5.—USING A TYPE '24 TUBE

Constants are the same as those of Figs. 2 and 4. The heater may be supplied with either a.c. or d.c., which may be taken from the receiver supply.

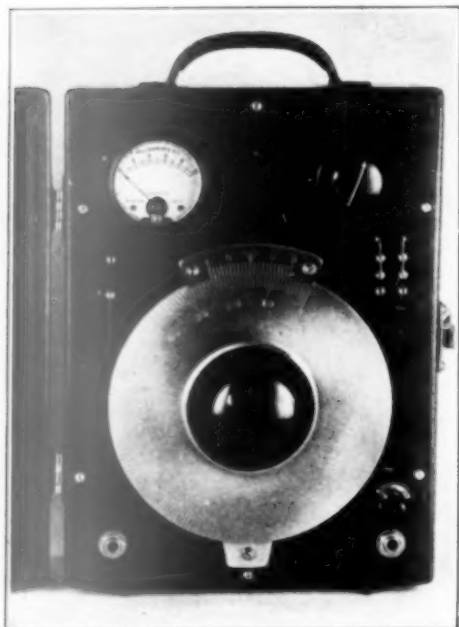
if necessary, to the 3500-kc. band. In fact, a fairly good calibration curve can be obtained in this way, although some of the points will not be inside the band and none of them will mark the edges exactly. It is possible, however, to get quite a few points inside the 3500-kc. band by listening to commercial stations on the high-frequency side of the 7000- and 14,000-kc. bands a great many points between 3600 and 4000 kc. can be secured by this method.

For example: WKU on 14,830 kc. might be picked up on the receiver and the fourth harmonic of the frequency meter tuned to zero-beat with the signal, giving a calibration point at 3707.5 kc. Or the receiver might be tuned to WEM on 7400 kc. and the second harmonic of the frequency meter tuned to the signal, giving a calibration point at 3700 kc. Again, WEG on 7520 kc. could be used, giving a point at 3760 kc. Innumerable examples of this sort could be cited, and with ten or fifteen scattered points a fairly decent calibration curve can be worked up.

It is in fact advisable to make up a calibration curve of this sort because you will become familiar with the operation of the frequency meter and

the curve will be helpful in finding the Standard Frequency Transmissions against which the meter is to be checked.

And now for the actual calibration from Standard Frequency Transmissions. By the time this story appears in QST W9XAM will have started



THE FIVE-BAND FREQUENCY-METER BUILT BY
F. E. HANDY

The small double-pole double-throw switch below the filament-rheostat knob puts the oscillator on either 1750 or 7000 kc. Harmonics are used for the 3500-, 14,000-, and 28,000-kc. bands. The dial is the six-inch National vernier.

its schedules, in addition to those which have been transmitted by W1XP (formerly W1XV-W1AXV) for so long a time, and it is probable that the new S.F. station in California will be ready to go within another month. When the three stations are in operation there will be at least one transmission a week available to amateurs in every section of the country, so there will be no lack of signals from which the frequency meter can be calibrated. The whole story of the Standard Frequency system will be found elsewhere in this issue, with complete schedules.

Suppose the 3500-kc. S.F. transmission from W1XP is to be picked up, and that the great night has arrived. Looking at the schedules, we find that the one for this band is marked "A," and that it starts at 8:00 p.m., E.S.T. Make sure the station Big Ben is on time, because these schedules are sent right on the dot and there is no waiting for those unfortunates whose clocks may be slow.

Now take a look at the calibration curve which

has been made up from points obtained by listening to commercial marker stations and find the dial setting on the frequency meter for 3500 kc. The meter should have been turned on fifteen or twenty minutes before the schedules start to allow the tube to reach a stable operating temperature. Tune in the signal from the frequency meter on the receiver and the latter will be set approximately to W1XP's frequency — maybe exactly if care has been used in making up the preliminary calibration curve.

When the clock shows 8:00 p.m. start tuning around for W1XP until you hear his QST. After two minutes of this he will start sending "G" very slowly, signing now and then, for three minutes. During this period the regeneration on the receiver should be reduced until the detector

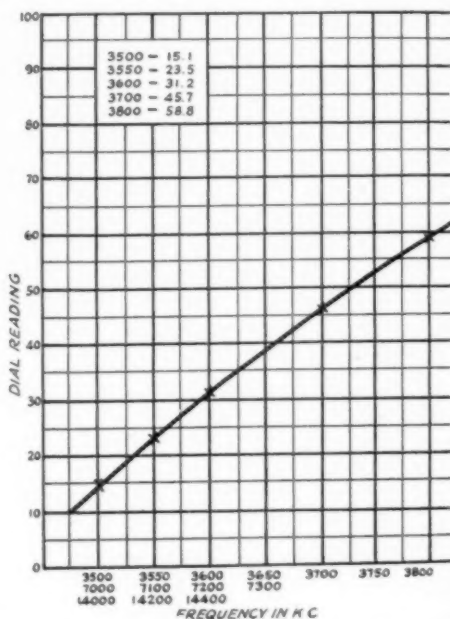


FIG. 6. — HOW TO MAKE UP THE CALIBRATION
CHART

Each of the blocks represents a half-inch block on ordinary cross-section paper (20 lines to the inch). Two sheets may be required if the meter covers the entire 3500-kc. band, and should be used in the interest of accurate reading. The chart must be large enough to introduce no additional errors to those already inherent in the frequency meter. It is a good plan to jot down the exact readings taken on the calibration points, as shown in the above drawing. The interpolated portions of the curve will not be as accurate as these points. It is also a good plan to put down the harmonic frequencies so the chart can be read directly on all bands.

is just out of oscillation, and the frequency meter tuned to zero beat with the S.F. signal just the same as with the receiver — except that in this case, we have a separate heterodyne. The sixth minute is the important one, because it is then that W1XP announces the exact frequency at the

moment, and the figure announced is accurate to better than 0.01% — often better than 0.001%. Copy down this frequency on a sheet of paper and immediately alongside it jot down the dial reading on the frequency meter. Get this reading to the nearest tenth of a dial division, if possible.

At the end of this minute, W1XP will announce the next frequency to be transmitted and will go off the air for two minutes to make adjustments. The next frequency will be 3550 kc. according to the schedule, and transmission will start at 8:08 p.m. Follow the same procedure again in getting the 3550 kc. and succeeding calibration points.

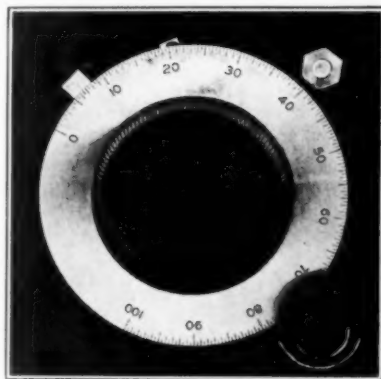
The procedure in the case of the "B" and "C" schedules is exactly the same, except that harmonics of the frequency meter are adjusted to zero beat with the incoming S.F. signals instead of the fundamental. The points on the higher frequency bands will be fewer, of course, because these bands are not so wide as the 3500-kc. band. On the 14,000-kc. band the harmonic of the frequency meter may not be strong enough to give a good signal when beat against the incoming signal, and in this case the receiver should be allowed to oscillate weakly and all three adjusted to zero beat. Whenever possible, however, it is better to have the receiver out of oscillation because receiver tuning is eliminated from the picture and there is consequently less confusion in getting everything tuned up. Furthermore, the interference from unwanted signals is less when the receiver is out of oscillation.

PLOTTING THE CURVE

When the Standard Frequency Transmission is finished and the set of calibration points completed, the next thing to do is to make up a curve for the meter. This curve should be drawn to such a scale that it can be read to a greater degree of precision than the dial on the frequency meter. There is certainly no logic in having a dial on the meter which can be read to a tenth of a division and then plotting a curve which is so cramped that it is difficult to estimate to half a division. Ordinary cross-section paper will do very well — but use at least two rulings to represent a dial division and allow not more than 5 kc. to the ruling — preferably 2.5 — on the frequency side.

Fig. 6 shows a satisfactory "spread" for the calibration curve, based on the use of ordinary cross-section paper (20 lines to the inch). A rather large sheet of paper would be required to take the whole chart covering the 3500-kc. band, but the curve can easily be split in two parts — one running from 3500 to 3750 kc., with some overlap on each side of course, and the other from 3750 to 4000 kc. The first chart will take care of the lower frequency half of the 3500-kc. band and all of the 7000- and 14,000-kc. bands. It is also a good idea to jot down on the chart the actual

dial readings at the calibration points — the curve is only for convenience anyway, and the best accuracy is only obtainable at the actual calibration points. While the curve drawn between the points may be — and should be — very smooth, it is really only an estimate. The



THE NEW G. R. DIAL

This metal dial, developed by the General Radio Company, is four inches in diameter, and has 200 divisions, numbered to 100. It may be obtained in either 180- or 270-degree rotation. The indicator rides on the edge of the dial, eliminating parallax. The division marks are fine lines, making close reading possible.

important thing for an amateur frequency meter to do is to define the *limits* of the bands accurately, and the Standard Frequency Transmissions make this possible. Therefore note particularly these transmissions which mark band limits.

The 3500-kc. calibration is of course useful on the other two bands as well. Simply multiply all frequency readings by 2 for the 7000-kc. band and by 4 for the 14,000-kc. band. It is a good idea to put all three down on the chart as shown in Fig. 6.

Great strides have been made in frequency measurement and frequency stability of transmitters during the past few years, with the result that tolerances have been tightening up all along the line. The present requirement for fixed stations above 1500 kc. is roughly 0.1%, and for stations on lower frequencies, particularly broadcasting, somewhat more rigorous. With hundreds of such stations on the air between 500 and 20,000 kc. a rather good calibration can be made for a frequency meter with the aid of the receiver and a list of stations and their assigned frequencies.

Although the frequencies do not fall directly in the amateur bands, a check on almost any desired frequency can be obtained by juggling harmonics to fit the case. It is a very interesting field for experiment for the fellow who thinks of something besides DX now and then — and when you get a large number of points which check out into a good curve you *know* you're right no matter what some fellow with a twenty-dollar

"wavemeter" may say about it. Besides, the Standard Frequency Transmissions can be used nearly every week to give a good check.

After an accurate calibration from Standard Frequency Transmissions has been secured, note the position of a few commercial stations who are on the air regularly and make a record of them

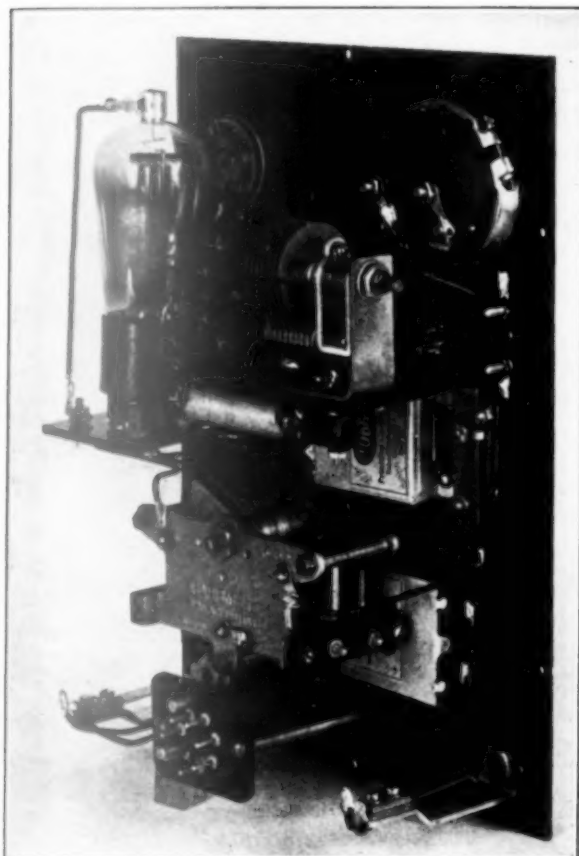
quency Transmissions and read the frequency from the calibration curve. The transmitter, however, must be treated a little differently.

Every good station has a monitor, and with its aid measurement of transmitter frequency is quite simple. First tune the transmitter to zero beat with the monitor. Then leaving the monitor set at this point, pick up the signal from the monitor in the receiver and treat it in the same way as any other incoming signal in measuring its frequency. The transmitter must be turned off, of course, during this step. In making a measurement in this way the phones used with the receiver, or else a resistor of the same value as that of the phones, must be plugged in the monitor. This will avoid the change in monitor frequency which would occur if the phones were removed and a short-circuiting plug used instead. The process would simply be reversed to set the transmitter on a desired frequency. The only difference between this and the common stunt of placing the transmitter at a given point on the receiver dial with the aid of the monitor is that an accurate measurement of the frequency is made.

It has already been suggested that the phones could be plugged in the screen-grid lead of the frequency meter and the meter used as a monitor. This will work best if the transmitter is on a higher frequency band than that to which the frequency meter is tuned, because the pick-up on the fundamental will be too great unless the frequency meter and its batteries are thoroughly shielded. In this case the meter must be calibrated with the phones — or an equivalent resistance — in place or the calibration cannot be depended upon. A separate monitor is very much to be preferred to such an arrangement.

Another possible way of measuring transmitter frequency without the aid of a separate monitor and without using the frequency meter for listening purposes is to listen to the transmitter on a harmonic of the receiver. For instance, if the transmitter is in the 7000-kc. band the receiver may be tuned to 3500 kc., picking up the signal on the receiver's second harmonic. The frequency meter would be adjusted to zero beat with the signal, and the frequency read accordingly. The receiver cannot be used out of oscillation, however, because harmonics are not present when it is not oscillating.

In using harmonics of a heterodyne frequency meter or in listening to a transmitter on harmon-



INSIDE THE FIVE-BAND METER

The arrangement of the parts is explained in the text. Battery connections are brought out to the Yazley socket at the bottom so that the battery cable can be plugged in.

also. The meter should be checked against them now and then to make sure the calibration has not changed. If such stations seem to shift more than a kilocycle or two the calibration should be checked against the next Standard Frequency Transmissions.

MEASURING TRANSMITTER FREQUENCY

Measuring the frequency of an incoming signal is a simple matter after the calibration has been taken. Simply adjust the receiver and frequency meter in the same way as to the Standard Fre-

de
C
C
C
L
L
R
B

M
T
can
read

ac
cov
fre
har
28-
sm
bet
The

ies of a receiver or monitor be careful that the transmitter is on the harmonic you think it is. It would be easily possible to listen on 3500 kc. to a transmitter supposedly on 7000 kc. but which was really on 10,500 kc. Perhaps the first adjustment should be a rough one with the receiver on 7000 kc.; although the transmitter will make a rather heavy noise all over the band it will reach a peak at some frequency which will allow identification of the harmonic.

A FIVE-BAND FREQUENCY METER

While a meter covering the 3500-kc. band will also adequately care for the 7000- and 14,000-kc. bands, it may be necessary to cover the 1750- and 28,000-kc. bands as well. F. E. Handy, A.R.R.L. Communications Manager, wanted to cover all five bands and built the meter shown in two photographs. The diagram appears in Fig. 7.

Two coils are used in this meter, one for the 1750-kc. band and the other for 7000 kc. The tuning condenser, a Cardwell Taper-Plate which has been double spaced, is adjusted so that when connected to the 1750-kc. coil the band is spread over the dial with a little leeway on each end. The midget condenser is permanently connected

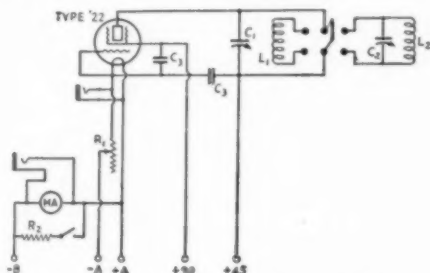


FIG. 7.—A FIVE-BAND FREQUENCY METER

The oscillator operates on 1750 or 7000 kc. by throwing the double-pole double-throw switch.

C₁—Cardwell 3-plate condenser (taper-plate) adjusted to cover the 1750-kc. band in conjunction with L₁.

C₂—50-μfd. midget condenser.

C₃—1 μfd.

L₁—260 turns of No. 36 d.s.c. on 3/8-inch form.

L₂—45 turns of No. 28 d.s.c. on 3/4-inch form.

R₁—50-ohm rheostat.

R₂—Resistor to extend range of milliammeter to 100 milliamperes. Exact value will depend on resistance of meter. This resistor is not required unless the meter is to be used for external measurements.

MA—0-10 milliammeter.

The open-circuit jacks are provided so that the milliammeter can be used in other circuits, and for plugging in a voltmeter to read filament voltage on the tube.

across the 7000-kc. coil and is set so that meter covers approximately 6950 to 7550 kc., the high-frequency limit being chosen so that the fourth harmonic of the meter will take care of the entire 28-mc. band. The 7000-kc. coil is mounted on the small sub-panel which holds the midget condenser, between the condenser and the front panel. The 1750-kc. coil is mounted on the underside

of the sub-panel directly over the main tuning condenser. Either coil may be selected by throwing the small double-pole double-throw switch on the front panel to the proper position.

A resistor in series with a single-pole single-throw switch is connected across the 0-10 milliammeter so that the range is extended to 100 milliamperes when the switch is closed. The switch is visible on the front panel to the left of the dial and below the milliammeter. The milliammeter terminals are brought out to a jack on the front panel so that the meter can be used for measurements in other circuits. There is also a jack connected across the tube filament so that a voltmeter can be plugged in to read the filament voltage on the tube.

The dial is a 6-inch National with the vernier scale.

THINGS TO REMEMBER

The chap who has stuck with this story thus far should have a fairly good idea of how a dynatron frequency meter should be built and used. Here is a little summary, however, put at the end to serve as a reminder:

1. Get a good solid condenser with wide spacing between plates, and which will hold calibration more than ten minutes. Get one with a fixed "tank" capacity if possible.
2. Make everything as solid as it can possibly be made. Keep the coil small and dope the wire so it can't come loose.
3. Keep the space current at the lowest value which will give satisfactory signal strength on all bands wanted.
4. When calibrating the meter keep the space current constant at the most satisfactory value and always have it at the same value when taking readings.
5. Allow the tube to warm up from fifteen minutes to a half hour before calibration; also before taking readings which you want to be especially accurate.
6. Check the calibration now and then to make sure it is holding, and recalibrate when necessary.
7. Don't remove the tube from the meter or change tubes without checking the calibration afterwards.
8. When you make use of a Standard Frequency Transmission drop a card to Headquarters and let us know about it.





The President's Corner

A WORD FROM

HIRAM PERCY MAXIM

PRESIDENT OF THE AMERICAN RADIO RELAY LEAGUE AND
OF THE INTERNATIONAL AMATEUR RADIO UNION

Looking Ahead

ONE of the things that has contributed a lot in past years to building up our A.R.R.L. has been our ability to look ahead. It is one of the very important ingredients of success. I believe it applies to every one of us individually, as well as to our organizations.

I have been wondering for almost a year now what it is that we radio amateurs ought to be doing *now* in order to have at Madrid, in 1932, the general set-up that is to be needed at that time. In other words, what is it we shall be kicking ourselves for not having done along in 1930 and 1931, when our representatives sit down in Madrid in 1932?

We can best judge the answer to this question by looking back at the Washington International Radio Conference of 1927. We were not exactly greenhorns in international negotiating in 1927, because we had been through the International Radio Congress at Paris in 1925 when our I.A.R.U. was formed. But, just the same, we had to watch our step when we found we were up against some 150 delegates from some 75 foreign countries, colonies, protectorates and what not, ninety per cent of whom had absolutely no use for amateur radio. It will be recalled that only by the skin of our teeth and the heroic effort of our spokesmen, backed up by our U. S. delegates and those of a very few other countries, chiefly Australia and New Zealand, were we able to have any amateur radio at all.

We do not want such a fierce fight in 1932. In fact, if you think enough about it, you wonder if things could not be so fixed by 1932 that instead of having a fight we might be offered some help. There's a whale of a difference between the two. I am even optimistic enough to believe that if we do the preparatory job well enough, we may be listened to favorably when we ask to have some of our bands widened. Now just what was it at Washington that caused most of the nations of the earth to be arrayed against us? It was that *they knew nothing about amateur radio*. If half of the magnificent story of amateur radio had been known to those foreign delegates, we would have had an entirely different kind of an experience. Ours is a magnificent story. I happen to know, because I have had to tell it and by actual experience know that it tells well.

If, then, our story is a fine one that will stand any amount of searching investigation — in fact, the more searching the better — then does it not follow that it's up to us to tell it to those delegates who will convene in Madrid in 1932? It seems to me it is. If I am right, then the thing to do is for us to roll up our sleeves and go to work telling it.

How shall we tell it? It seems to me that, since it is in foreign countries that the telling is necessary, we of the A.R.R.L. who have the story should see to it that our brothers in all of the nations where we have I.A.R.U. representation set about an organized effort to get a steady supply of amateur radio knowledge into the hands of those men who will be delegates at Madrid in 1932. If the story of amateur radio as we know it here in America were to be got over to those who will be present there at that time, it would make things tremendously different for our representatives.

Hiram Percy Maxim

A Multi-Range Receiver With Four Tuned Circuits

By Robert S. Kruse*

There is a marked tendency in high-frequency receiver design towards single-control tuning of two and more circuits. The receiver described by Mr. Kruse involves true single-control tuning of four circuits, and the trick is successfully accomplished. The receiver has a number of features which can be profitably adopted for amateur use. — EDITOR.

THE amateur receiver with but one tuned circuit seems to be passing, at last, as did the "single circuit" broadcast receiver of evil memory. Two tuned circuits are now accepted as a matter of course, even though one is sometimes accompanied by another control. Logically, and surely, we shall proceed to more tuned circuits, more r.f. gain, and easier operation.

The widespread opinion that such receivers cannot be built to operate with single control at high frequencies has some basis in fact, but is not wholly correct. The single-control receiver with two tuned circuits has indeed reached commercial form for frequencies as high as 33,300 kc. (9 meters), and is in wide amateur use.

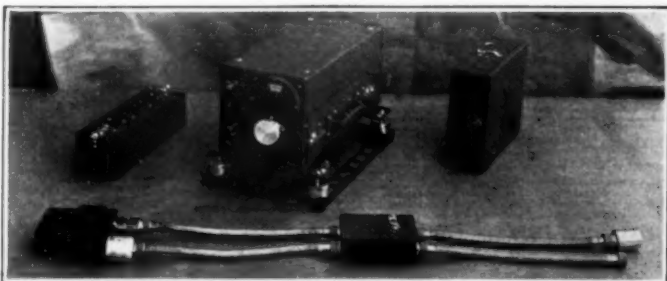
With so definite a tendency in view it is interesting to look ahead toward the future receiver. This need not be done blindly for there has only just appeared a receiver which, though designed for aircraft use, may very well be the forerunner of the amateur receiver of the future. That is our story.

The Stromberg-Carlson Model D Aircraft Receiver operates at frequencies as low as 235 kc. (1276 meters) and as high as 8000 kc. (37.5 meters) with its normal coil equipment, maintaining over this range a very high degree of sensitivity and selectivity much above that found in the usual high-frequency receiver. It is purely single-control, uses but five tubes, makes small demand on the plate supply, and is designed with particular attention to the reduction of noise. The frequency range, incidentally, can be perfectly well extended above 8000 kc. by means of additional coils, not normal to the commercial

set. This has been done at Aircraft Radio Corporation, where the set was designed. Again the performance was greatly superior to that of the usual amateur set.

GENERAL ARRANGEMENT

Since the Model D is primarily meant for use in aircraft, its construction has considered the requirements of that severe service. As may be seen from the photograph, a cushioned mounting is provided for the set, and the inter-connections between the set, the control-head, the junction



THE AIRCRAFT RECEIVER AND ITS ASSOCIATED EQUIPMENT

The receiver is in the center with the spare coil box at its left and the special B battery case at its right. The control box containing the volume control and "off-stand-by-on" switch is at the left end of the assembly in the foreground. The junction box is the affair in the center.

box and the battery box, are run through highly flexible metallic braided hose. This hose provides electrical shielding and mechanical protection. It is obtainable in lengths of 2, 3, 4, 7 and 10 feet and is connected to the various units by means of screw-couplings. This arrangement provides ease of servicing and great flexibility in the placement of parts in various types of ships. A remote tuning control can be supplied, but this has not been shown here, as it is solely of aircraft use, being intended to permit placement of the set in the fuselage at distance as great as 35 feet from the pilot or other operator. One may, however, note that the set cannot be fussy if such an installation is to be practical.

*Engineering Consultant. Former Technical Editor of QST, 103 Meadowbrook Road, West Hartford, Conn.

From other photographs and from the general diagram of Fig. 1 it may be seen that there are 3 stages of straightforward r.f. amplification, a "bias" detector, and one resistance-coupled audio stage. Study of the diagram will show that unusual attention has been paid to the "de-

were to be used primarily for c.w. reception it would be simple to introduce controllable regeneration and self-oscillation. This, however, would be of no advantage whatever for modulated signals.

The antenna used in the plane is a vertical

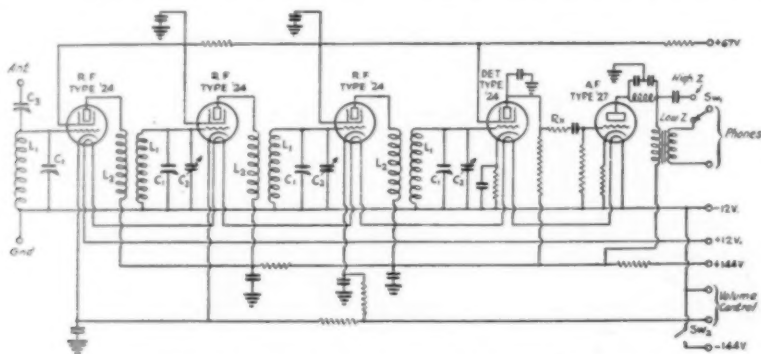


FIG. 1.—THE SCHEMATIC CIRCUIT OF THE RECEIVER

The heaters are connected in series and are supplied with filament current from a 12-volt storage battery. The switch SW₂ is part of the three-position switch in the control box; it is opened in the "stand-by" position, cutting off the "B" supply but leaving the heaters on. The volume control resistor is in the negative "B" lead to the r.f. amplifiers. The inductances L₁ and L₂ are interwound on the plug-in coil forms. Suggestions for their construction are given in a footnote. The condensers C₁ are ganged for single control. The trimmer condensers, C₂, are integral with the ganged variables and are set by a special screw-driver when the set is adjusted. Bias for the various tubes is obtained by resistors in the cathode circuits.

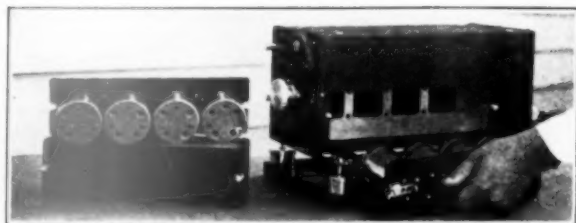
The resistor R₂ in the coupling circuit between the detector and audio stage is an interesting feature. It has a resistance of about 250,000 ohms and serves to prevent r.f. overloading of the audio tube's grid circuit but does not materially affect audio-frequency coupling. The output is arranged to work into either high-impedance or low-impedance phones, a special output transformer being used for the latter. Specifications for the various resistors and by-pass condensers are not available but should follow usual practice quite closely.

coupling" of different r.f. stages by means of by-pass condensers and de-coupling resistors. As shown, the circuit does not provide for oscillating-detector reception, but this does not mean that the thing is impossible with this sort of a set. Much c.w. reception has been done at Aircraft

metal mast—if one may use that term for a stub only 5 feet high. The pickup is at all times sufficient so that the ever-present background makes a great racket when the sensitivity control is at maximum, even though the ignition system is carefully shielded and the metal parts of the plane well bonded to prevent loose-contact noises. When used at a ground station the set needs no more than a 10-foot antenna; even this is sometimes excessive at quiet places miles from the electrical disturbances of any town.

NOISE LIMITING FEATURES

With such sensitivity the noise problem is of some importance. It is attacked at several points in the set. The usual broadening effect of antenna resistance is avoided because the high sensitivity permits the use of an antenna too small to produce such broadening. Thus there is good preselection of the desired signal, as against noise and interfering signals. The selectivity through the r.f. system as a whole is about that of a very good broadcast receiver with four circuits, when working in that frequency range. The selectivity unavoidably



A COMPLETE SET OF COILS IS PLUGGED IN WITH ONE MOTION

Each coil carries its own shield and the four shields are fastened permanently to the metal strip which serves as a side-plate for the set when the coils are in use or as the cover for the coil box when they are not in service.

Radio Corporation with the set using a separate heterodyne. As in the case of modulated reception, the only limit on reception has been the noise level due to electrical disturbances arriving at the antenna. If, for any reason, the receiver

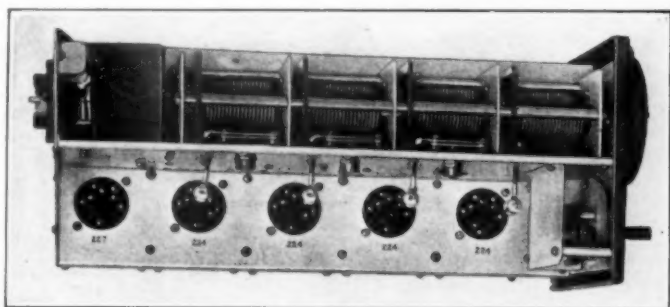
decreases at the higher frequencies but remains much superior to that of sets with fewer tuned circuits — especially to the type of amateur receiver with one lonesome tuned circuit. The noise which reaches the detector is, of course, passed through to the audio tube. At this point, it encounters an audio filter which cuts off all high-pitched noises, passing only audio frequencies below 3000 cycles. A very large part of the energy of static and of man-made electrical noises, as well as the notes of off-tune c.w. stations, lie above that pitch. These things are severely attenuated without the undesirable features of a peaked audio transformer which reduces noise but spoils voice reception for the phone man and afflicts the c.w. man with a wearisome and unchangeable fixed pitch at which all signals must be heard. Another feature of particular interest to the headset man is the output device. This keeps the "cans" free from the plate supply voltage and also permits the use of either normal high-impedance phones or the new 120-ohm phones which weigh but half as much as the old sort and are thinner, flatter and far more comfortable.

The use of heater-type tubes through the entire system is in itself a noise-eliminating feature in the plane where a battery-charging generator is operating during reception. On the ground this is of no great consequence but may be pointed to as offering a useful suggestion for future sets with a.c. supply.

Anyone who has used shielded high-frequency receivers must be aware of the exceedingly irritating performance given by a set with various parts of the case in uncertain contact, as for instance, in the tongue-and-groove aluminum cases of several years ago. The noises and jumpy reception of such a set are bad enough on the ground and would, of course, be intolerable during the vibration of a plane. All contacts between parts of the case are, therefore, either screwed or riveted permanently or confined to points where good pressure-contact (spring) can be maintained. Thus the removable tube-compartment cover and the removable panel carrying the coil-gang are felt lined and make no contact with the case except at the retaining pegs, where positive spring contact is made by the latches holding the part to these pegs. These latches, incidentally, are in themselves something of an innovation after so many years of sets with loose screws, thumbnuts, snaps, turn-buttons and springs —

not one of which ever contrived to combine ease of removal with positive action and silent electrical contact.

One other anti-noise provision must not be overlooked. This is a 3-position switch providing points for "off," "on" and "stand-by." The third of these is used during transmission and leaves the filaments hot while cutting the r.f. cathode returns free from ground. The shielding and filtering of the set is so thorough that this leaves the detector and audio stage almost com-



THE TOP OF THE RECEIVER'S WORKS

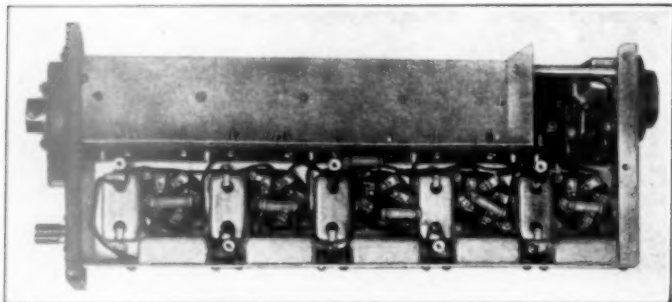
The control-grid connections between the tubes and the tuning condensers are extremely short and pass through the shielding at right angles. The mechanical construction is obviously rigid. The four condenser rotors are all on one shaft. One end-plate of each condenser is metal and the other is high-grade bakelite, the intervening metal end-plates serving as baffles. The coil compartment is immediately below the condenser gang. The antenna trimmer condenser is in the small compartment to the right of the tube sockets and the audio apparatus is at the left end of the condenser gang. The battery input and audio output multiple plug is mounted on the left end and the tuning control on the right end of the set.

pletely silent, even in the presence of a transmitter in the same room.

THE FOUR-GANG CONDENSER

To gang four tuned circuits successfully the stray capacities must be reduced as far as possible and made as nearly equal as is practical. In addition to this, the operation of the set, including coil changes, should not vary any capacity in the set, except the tuning capacity. This last ideal is not altogether attainable since it is necessary to change the r.f. cathode-return resistance in controlling volume, also to tolerate a gradual decrease of plate potential (if dry cell plate supply is used), together with some small unavoidable mechanical irregularities in the gang itself. Since these things all produce small capacity alterations in one or several stages, one may not work at too low a value of tuning capacity. The gangs in this case have a capacity of 150 $\mu\text{fd.}$ per section and are shunted by an air-dielectric trimmer of 25 microfarads capacity, except for the antenna-input circuit which uses a trimmer of twice this capacity in series with the antenna capacity. A fairly high minimum capacity is thus assured and minor variations are decreased in importance.

To any possible objection of such a high C/L ratio one may reply that the set has sensitivity in excess of any need, and one might as well trade some of it in for the exceedingly valuable feature of single control, which would not otherwise be practicable. The design of both the air-dielectric trimmers and the tuning gang itself has been aimed at very low loss and extreme mechanical rigidity. Thus, though there is a fairly high minimum



BENEATH THE CHASSIS

BJ-p.122 condensers, resistors and supply wiring are judiciously placed.

capacity, it is not through a high-loss material. The condenser gang has rotors and stators of the familiar soldered-plate type. It is very rigid because of the small size of the plates and the use of 5/16" steel rods for the lengthwise members of the frame. Cadmium plating is used on rotor and stator to prevent corrosion of the conducting surface under conditions of high humidity. The air trimmers are simply small variable condensers of a substantial sort with their shafts slotted for screwdriver setting. After setting they are sealed with wax and need no further attention. The antenna trimmer may be reached through an opening in the case as there is occasionally some reason for antenna alteration and a realignment at this point.

THE COILS

The set, although having many coils, is altogether free from the usual bunch of loose coils. As may be seen from one of the photographs, all four coils of a set are mounted on a panel with a handle. This panel acts as a cover for the coil box, or closes the side of the set when coils are inserted in it. The thing is done with one motion and with less effort than is required for some single coils. This is due to nice construction and to the use of spring-contact plugs of the familiar "spring banana" type.¹

Each coil carries its own shield with it, which at once affords protection and absolutely assures that the coil will be at the same distance from its shield and therefore will have the same tuning range. The possibility of repairing the coil or

¹ The General Radio plugs familiarly known to amateurs are of this type. — EDITOR.

replacing a plug is provided for by making the coil shields sectional with the cover secured to the panel or base and the shallow can bottom carrying the coil, which is removable by means of a bayonet catch released when the can bottom is turned slightly. One of the photographs shows a coil removed from its can. From this picture and the one showing a set of coils one may see the construction. The coil form is of R-29 low-loss bake-

lite, moulded into a smooth cylinder with a flange at one end to carry the terminals. Threads are machined into the form for carrying the windings. The flange does not carry the plugs in the familiar manner but instead carries the jacks or sockets. The plugs are inside the set where they will not be bent over by accident. The primary of each r.f. coil is "inter-wound" with the secondary, in other words, the primary turns lie between the secondary turns.²

Each coil set gives a tuning range of approximately 2 to 1, in terms of wavelength. The familiar objection to such a range is not substantiated with a high-gain set. In order to understand this one must recall how exceedingly hard it was to "juggle" a distant broadcast station into tune with the early broadcast receivers and how much easier it is to do the same thing with a modern high-gain receiver of enormously greater selectivity.

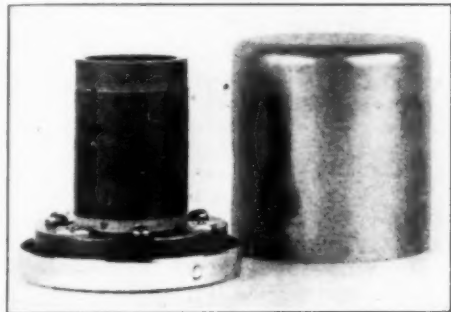
SPECIAL FEATURES

The battery drain of the receiver is surprisingly modest, being about 7 to 12 milliamperes (depending on the setting of the volume control) at 144 volts on the plates and 67 volts on the screens. The odd voltages are due to the use of a special compact battery (Eveready Type 769 Aircraft) but are not exceedingly critical, as is shown by the continuance of good performance during a long battery life. When connected as shown, the filament circuit is adapted to use at 12 volts (the rating of the common aircraft storage battery) and the drain is accordingly that of a single filament, 1.75 amperes.

The story is not complete without some mention of features of aircraft interest. Among these is the flexibility that has been referred to. The

² This is the same type of coil construction used in the new National single-control high-frequency receiver. The plate coil of a preceding stage is wound between the turns of the grid coil of the following stage (or detector). The number of plate turns being 66% to 100% the number of grid turns. The specifications for the amateur bands will depend on the capacity range of the tuning condenser as well as the minimum capacity across the coil. The figures given for the various bands in articles describing other tuned r.f. receivers can be used as a basis. — EDITOR.

set can be located almost anywhere in the ship and may be set on its cradle or hung from it by one simple change. Coil changes are not normally made in flight, but where this is to be done the set may be located in an accessible place and coils can be changed by the pilot, even when he has no one to whom he may turn over the controls. This has been done repeatedly. The junction box is simply a place into which go cables from the



ONE OF THE COILS WITH ITS SHIELD

Plugs in the receiver fit into the jacks on the flange at the bottom of the R-29 coil form. The grid coil is space wound with enameled wire and the plate coil is wound between turns of the grid coil.

"A" and "B" battery and the switch box, and out of which goes a single cable leading to the set. The junction box must be near the set; the other units may be located at convenience, the actual tuning control being intentionally separated from everything (including volume control and off-on switch) which need not be visible. Thus even the most cramped plane may be fitted out with a set.

Fine tuning by means of a remote mechanical control may seem dubious. It is actually quite workable. The drive is through a flexible shaft of any necessary length up to 35 feet. At one end of the shaft is a small reduction gear which goes into the place of the tuning knob shown in the set photograph in this paper. The shaft turns a great many times while the gang tuning condenser is moving once across its range. Thus the wind-up or slack (which is not altogether avoidable in even a very good flexible shaft) is of little importance. On the other end of the shaft is other gearing — for it is not practical for the operator to turn a knob several hundred times to "go across the scale." Actually he turns a small crank 30 times to traverse the tuning range. At the same time a small dial on the tuning unit makes $\frac{1}{4}$ of a turn. This dial has a 100-division scale, distributed over 270 degrees. The entire machinery, though it sounds rather fearsome, is easier to tune than most broadcast receiver controls — and smoother in the bargain. When direct control is used, as shown here, the control is that of a normal good direct-drive micro-dial.

Other things that are not visible in the photographs and rather tiresome to detail may be mentioned in brief. They are the care in dust and moisture proofing by means of gaskets, the mechanical solidity and the extreme accessibility for repairs. The last may be better appreciated by examination of the photograph showing the by-pass condensers and small resistors under the tube shelf. The connections between the shielded metallic conduit and the various units have been spoken of as being made by means of screw collars. This is correct only as applied to the junction box and battery box. The other connections — set, dynamotor and control head — are by means of armored multi-plugs which are retained by means of a spring catch when in place but may be released by thumb pressure.

The dynamotor just mentioned is a small affair which mounts on a hollow base containing the filter for the plate current supplied by the dynamotor. Whether dry battery or dynamotor be used depends on the preference of the aircraft owner.

The utility of a multi-range high sensitivity set that is not cranky in tuning is manifest enough in aircraft work. "Range" signals — radio beacons — operate on high frequencies where not a great deal else save occasional weather information is to be found. For entertainment of passengers, handling of message traffic, or two-way telephone additional frequency ranges are essential, although hitherto aircraft have had to be content without this utility, for it is even less practical to manipulate four separate coils into their respective sockets on a plane than in a land station.

Editorials

(Continued from page 8)

And, it seems to us, real progress has been made. We would like to urge upon those who are displeased a sober realization of the fact that A.R.R.L. decisions must be made on the plan of the greatest apparent good to the greatest number, and the further realization that the plan of government is bound to work out satisfactorily if one is willing to accept the idea of majority control on which A.R.R.L. is founded. When members do not agree with policies, their remedy is to change the policy-makers if they can, and admit they're wrong if they can't. Half of the A.R.R.L. divisions are holding elections this autumn. The new directors should be truly representative of majority sentiment in their divisions on all major amateur questions. Right now is your constitutional opportunity to see that this condition is satisfied, and it's nothing short of a bounden duty that you see that it is.

K. B. W.

High Frequency Notes

28 Megacycles Dormant During June Tests—Announcement of R.S.G.B. Tests During January, 1931—Future High Frequency Experimentation

By Clark C. Rodimon, Managing Editor

IT is our sad duty to relate that after all our preparation and excitement over the June 28-mc. tests reports from four continents are the same — no DX signals were heard. Often the correspondents would mention being able to hear and work stations on 28 mc. until the week before the tests, then all went dead, and to this writing has stayed in the same condition. If nothing else, we must admit that original premises of several experimenters appear to be correct — that 28 megacycles is not usable during the summer months. Thus we must content ourselves with the consolation that we proved their contentions. We had wholehearted cooperation from Great Britain, through the efforts of Mr. H. J. Powditch, G5VL, of the R.S.G.B., as well as amateurs on the continents of Europe and Oceania, not to mention the China stronghold of Mr. Rodman, XU2UU.

We are going to present a few brief notes that have come into Headquarters relative to high frequency communication in an informal manner; quite a few deal with the 28-mc. tests.

 "No reports of reception of your stations (U. S. A.) have been received during the 28-mc. tests.

"G6LL, who was the most successful station during our tests, reports no results. G5YK only heard a number of European commercial harmonics. Both of these stations put out test calls but with no results outside of a few local contacts and reports.

"While on the subject of 28-mc. tests may I add that we shall be running a further series of tests during January, 1931 and ask in good time for the collaboration of A.R.R.L. members. (Definite dates and times of these tests will be announced later. — EDITOR)

"Copies of the 1930 test results were sent so far as possible to all American stations who reported our signals. If any were inadvertently overlooked I would be glad to forward a copy upon receipt of a card." — H. J. Powditch, G5VL, Contact Bureau Organizer, R.S.G.B.

 From several sources we received a message from ZLAAA saying to disregard reports of 28-mc. QSO with Europe until we received confirmation

from him. This confirmation never came so probably the lane between Europe and Oceania has never been bridged on 28 mc. We know that schedules between England and Australia have been kept, but all reports so far have been negative.

 Several reports were received from G2JU during and after the 28-mc. tests. They all contained the same news — no signals save local harmonics. G2JU was transmitting with a d.c. crystal signal on 28, 392 kc.

 From W2BON we received word of no success on 28 mc. and a prediction that 28 mc. will not be usable until August. W2BON is also experimenting on 56 mc.

 W1AXV reports being heard in Uruguay by CX1FB on May 25 while transmitting on 29 mc., but no DX reports during the June tests.

 W1SZ was heard locally.

 W1PI was active during the tests but reports only local contacts with other experimenters.

 W2AJP reported for every week-end and during the week-end of June 15 he succeeded in hearing W9EXW and worked W9AZZ but for only a few moments for fading was very bad. This was on 28 mc.

 W9FUR reports hearing W4NH on 28 mc. during the first week-end test.

W9AZZ reported hearing nothing on the first two week-ends of the 28-mc. tests but on the third week-end directly after a local thunder storm, while the sky was still cloudy he succeeded in working W2AJP, W2ACN and W8FZ; hearing W2BG. On June 22 W8SS was contacted with good signal strength both ways. The last week-end the band was completely dead. It is interesting to note from the report of W9AZZ that the only contacts and reception were made when the sky was overcast. He also noted that with his reflector transmitting antenna fading was not nearly so pronounced. No foreign signals were heard.

(Continued on page 74)

How Our Signals Look

An Oscillographic Study of Short-Wave Stations

By Paul E. Griffith, W9DBW*

HAVE you ever turned on your receiver just as the sun was setting and listened to the terrific QRM on the 7000-kc. band? I'll wager you have; and you wondered where in the wide, wide world a few thousand amateurs could get half as many different kinds of notes, varying from the purest of pure crystal-controlled d.c. to the worst kind of ripping, gurgling, buzz-saw like, a.c. You ask

because most amateurs use full wave rectification in their plate supply equipment. A "pure d.c." note is caused by the absence of modulation of the carrier frequency in any way. Let us now approach this same subject in another way; a way that is very neat and productive of real results.

To most amateurs the word "oscillograph" is merely a meaningless word that is hard to



FIG. 1.—THE OSCILLOGRAPH SET-UP

yourself what is the cause of so many variations in note when the *QST* Technical Development Program took care of the main features of a modern transmitter which would give a steady, smooth wave, pleasing to the ear and pleasant to copy.

In the first place amateurs will use poorly rectified and filtered plate supplies. In the second place, they will adjust their transmitters very poorly, so that key thumps, chirps and surges are prominent. Lastly, they do not use "hi-C" circuits; and, what is more important, they do not use the common sense they were born with.

Do you know that a "good r.a.c." note is caused by the modulation of the carrier frequency of the transmitter by the a.c. components of the plate supply? As a rule, the 120-cycle modulation of the wave is the commonest

pronounce and harder yet to spell; but to one informed in the more advanced stages of radio it is the name of a wonderful instrument for measuring and studying a.c. waves and transients of frequencies up to 10,000 cycles per second. It usually consists of a very fine loop of silver ribbon mounted between the poles of a very strong magnet. Current passes down one leg of the loop and up the other, causing a motor action which rotates the coil slightly. Mounted on this coil is a very small mirror, about the size of two pin-heads side by side, and very light. A beam of light is focussed on this mirror and reflected from the mirror to a film or to a revolving mirror for visual checking of the action. If an a.c. wave is sent thru the element the motor action will cause the mirror to vibrate and the beam of light to deflect, thus tracing on the film the wave-form of the current passing through the wire. The element will give a true picture of any frequency up to 1200 cycles and a slightly less

* Electrical Technician in Psychology, State University of Iowa, Iowa City, Iowa.

accurate picture of frequencies as high as 10,000. The falling off of accuracy with the increase in frequency is due to the inertia of the mirror. In use, the element is immersed in a bath of Nujol for damping purposes only.¹

There are also other types of oscillographs — the electrostatic, rather than the electro-magnetic as above; the string oscillograph; the cathode ray oscillograph; and a refinement of the latter in the Dufour oscillograph, which is about the fastest known. With it waves of a frequency of ten million can be taken.

Since I was fortunate enough to have a six-element Westinghouse portable oscillograph of the Duddell or electro-magnetic type in the laboratory in which I work, I decided to make a few pictures of the waves of amateur and commercial stations heard on short waves. This was done by passing into the oscillograph the output of a short-wave receiver through a special impedance matching transformer. In every case the reproduced wave is that of the beat between the oscillating detector of the receiver and incoming wave, and since all modulations of the incoming signal are reproduced in the beat note, it is possible to study the waves nicely.

The photographic apparatus used is that described by Travis and Hunter,² and enables the operator to take a picture four hundred feet long if needed, but ordinarily one four-hundred foot roll of Eastman Super-speed, 32 mm., motion-picture film is sufficient to make a great many records. Because the camera is turned by hand it is necessary to have some sort of time line on the film, so the usual method is to pass 1000-cycle current from a General Radio Type 377 Low Frequency oscillator through one of the three elements focussed on the film. The signal being studied is put through another element and the third is used for anything else necessary. In our study it is left unactivated and shows up on the film as a white line. The use of the 1000-cycle time line is a great convenience, enabling one, as it does, to read the records in thousandths of a second. An illustration shows the oscillograph with the camera in place. When used to check visually the incoming wave-form, the place of the camera is taken by a revolving mirror which provides the time element necessary to make the wave-shape visible.

Trouble was had at first in getting sufficient amplitude for the correct recording of the waves received, but when a Type '40, a Type '12-A, or a Type '99 tube was used as detector in place of the Type '01-A, the amplitude of the signal was more than tripled.

¹ A splendid explanation of the use of the oscillograph was given by G. F. Lampkin in *Radio*, August, 1929, page 28.

² A more complete description of the apparatus is given in the paper, "The Relation Between Intelligence and Reflex Conduction Rate," Lee E. Travis and Theodore A. Hunter, *Journal of Experimental Psychology*, Vol. XI, No. 5, Oct., 1928.

The photographs shown are those chosen from a number of films because they illustrate a few things in regard to keying, transmitter adjustment, frequency stability, and plate supply. In all cases the receiver was untouched while the picture was being made, so that any change in the signal was due to the transmitter. Even though the receiver was supplied with d.c. throughout and no a.c. induction could be heard in the phones, the oscillograph shows that a slight bit of 60 cycle a.c. was picked up by the amplifier — just enough to cause a slight modulation of a wave of constant amplitude — but of a known strength, so no harm was done.

In the pictures to follow the bottom line is the 1000-cycle timing line. The signal studied may occur on either of the two remaining lines, depending upon which of the two lines was used at the time the record was made.

In Figs. 2 and 3 we have pictured the waves of excellent stations. Fig. 2 is the wave of an amateur crystal-controlled station having a pure,

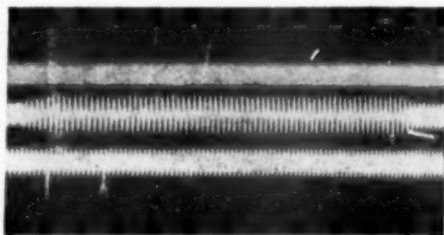


FIG. 2

unmodulated carrier. Notice how the amplitude of the wave remains constant except for the slight a.c. modulation due to amplifier pick-up. The frequency of the received audible signal is 900 cycles, that being the frequency of the tone most pleasing to the ear and the loudest. It stays constant during the entire time the key is down. This is as it should be and is the kind of wave that every station should emit. The keying is very excellent because the signal builds up gradually and stops gradually. Credit should be given W1ID for this picture, as the wave belonged to him.

Fig. 3 is that of a modern commercial station, WEZ. It is perhaps the best station heard yet. Here is a wave that has all the requisites of an excellent station: no keying surges, a pure d.c. (no modulation) wave of constant frequency; and perfect spacing. This was taken just after it stopped sending a machine-gun-like string of dots. The beat frequency is 1000 cycles within the limits of error. Our definition of an amateur Utopia would be one in which all amateurs had waves like this and had fists as good as the machine that sent that "d". The spacing is perfect, each space being 0.018 second long, the total "d" consuming 0.132 second.

Just to prove that not all commercial stations are like WEZ, figure 4 has been inserted to show what WIZ's wave looks like.

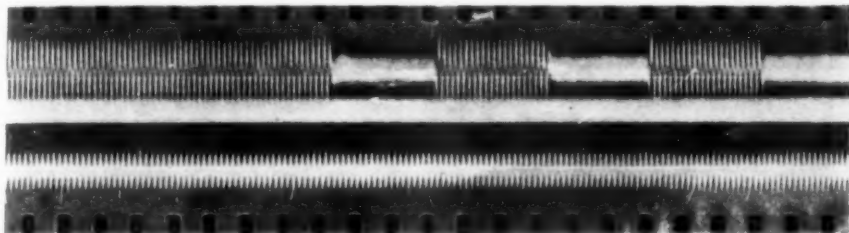


FIG. 3

This is a beautiful illustration of key clicks and key thumps, such being very prominent at the beginning and end of each dot or dash. Notice that the amplitude of the signal decreases after the initial keying surge, gradually building up, only to be broken by the surge at the end of the dash. That it is not fading is shown by the fact that all

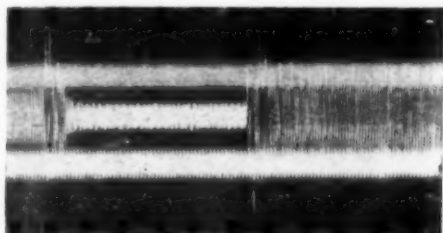


FIG. 4

the dots and dashes on the six feet of film of this station have the same shape of envelope.

"Wobulation" is defined as the change of carrier frequency on modulation; it is inherent in most amateur and commercial self-excited transmitters using incompletely filtered plate supply because of the change of frequency of the emitted wave with change of plate voltage. Also, dust in a variable condenser; some r.f. leakage somewhere; some poor contact or other hard-to-find loss may cause wobulation.

Fig. 5 is that of an amateur station's wave which is afflicted with "wobulation," due, probably, to some irregularity in the transmitter proper. The sudden change in frequency is marked, and is the cause of the roughness heard in the waves of some stations.

Fig. 6 shows that modulation of a wave may be complete provided some means of keeping the output frequency constant is provided. There is no "wobulation" at all, contrary to what one would expect, because the transmitter is crystal controlled. The beat frequency remains constant regardless of modulation; it is 1000 cycles and is modulated at — according to the film — 112

cycles. This is one of the Department of Commerce short-wave air mail radio stations which uses crystal control with 60(?)-cycle a.c. on the

plates of two quarter-kilowatt tubes in push-pull as the final amplifier stage. Most of us have heard these stations on 88 meters in the evening and know how sharp and easy to copy they are. They

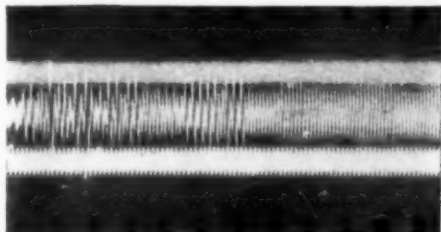


FIG. 5

would not be sharp if there were any "wobulation."

It is to be seen in this film that every other cycle of modulation gives a "push" of greater amplitude than the preceding one. The only reason that can be assigned at the present writing for this difference is that one tube of the final amplifier is a little off tune and does not contribute as much power as the other tube does.

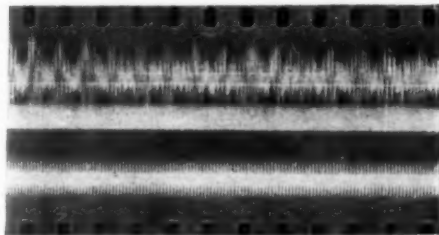


FIG. 6

Another point of interest that we see is that rapid fading shows up beautifully, the amplitude of the incoming wave being reduced one-half in 0.13 second.

A very good example of a chirpy note is exhibited in Fig. 7. A signal sounds chirpy because

it changes frequency at the beginning or end of the dot or dash. In the phones it is represented by a change in beat note from low to high pitch; and in Fig. 7 we have exactly that condition. Spurious oscillations of a different frequency are first to appear, then the set builds up to a steady frequency after the first 0.009 second. This note

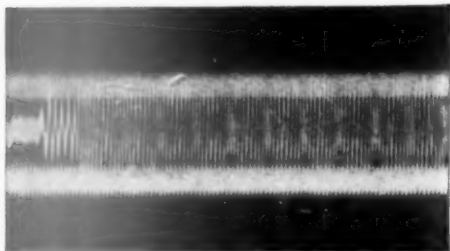


FIG. 7

would be classified as "near d.c." or "very smooth r.a.c.," since its amplitude is practically constant and it has a slight 120-cycle modulation. The beat frequency changes very little and is of a 1000-cycle pitch as shown by the fact that every peak of the wave touches a peak of the 1000-cycle time line.

Most amateurs do not have the wherewithal to purchase a motor-generator set, but those who are fortunate enough to own one are sure to put it to good use. Fig. 8 indicates the wave produced by a station using one.

There seems to be a slight chirp at the beginning of the transmission and perhaps a thump, but it is not serious. The modulation is difficult to analyze, but it is probably due to the commutator ripple of the machine. It seems to me

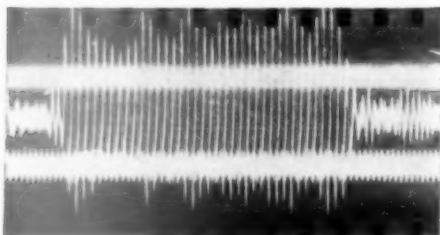


FIG. 8

that perfect keying is exemplified at the end of the character, the amplitude decreasing gradually to zero while the frequency remains constant. Notice the background noise when no signal is being received; it is due to tube noise and local motor QRM.

If you have followed this discussion of notes and waves closely you will have observed that as we progress the waves shown get rougher and rougher. This is because it was thought necessary to set a good example first before exposing the reader to the worst.

If you use no filter and have a "rotten rectifier" (apologies to the Old Man), then take a look at Fig. 9; see the peaks and change in amplitude due to the 120-cycle modulation; the frequency modulation; and then the poor keying; see for yourself what happens and go to the nearest "ham" supply store for some good chokes and filter condensers. Be sure that you have a good "hi-C" oscillator tank circuit and that you are not overloading the tube; use loose coupling to the antenna and make the tube oscillate easily; then, and only then, look at Fig. 2 and 7 again to see what improvement you have made in your note. The chances are that your note will be good, smooth, probably d.c., and steady.

To cap the climax (and this is no tobacco advertisement), we have before us, ladees and

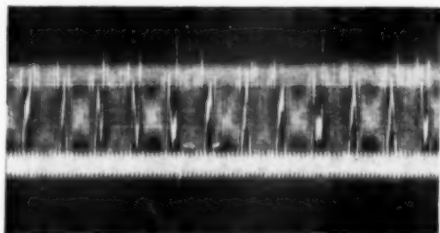


FIG. 9

gentlemen, in Fig. 10, just about the "world's worst" wave, note, mush, or what have you, as put out by some unknown commercial station operating in a 75-kilocycle band in the vicinity of 45 meters.

The plate supply sounded like it was 500 cycles, although the only man who knows is the operator himself. Not only was this station as broad as a barn door, but also it was as broad as

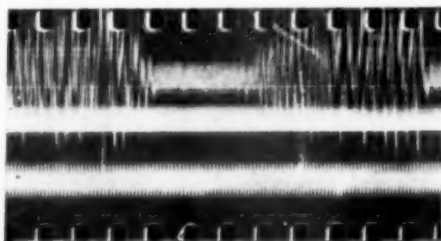


FIG. 10

the door of a hangar built for housing tri-motor planes.

I defy anyone to analyze this wave, because it is due to a.c. on the plate and the result of such a.c. on the plate is our old friend, Mr. "Wobulation," except, of course, in the case of crystal control. Compare this wave with the wave of Fig. 6, the crystal-controlled, a.c.-on-the-plate, wave. Notice the difference — the beat frequency

(Continued on page 86)

Neutralizing Radio-Frequency Amplifiers

By Robert T. Foreman, W9ZZE*

THE master-oscillator power-amplifier type of transmitter, and especially its crystal-controlled version, is becoming daily more popular with amateurs; wide-spread adoption of this arrangement would do much to solve the problem of congested bands. Apparently the biggest obstacle most amateurs encounter is the problem of neutralizing the final amplifier or amplifiers. It is a simple matter to set up a crystal-controlled or self-controlled tube and get it to work smoothly, but when its output is connected to the grid of the amplifier or buffer tube, one of two things usually happens: Either the crystal stops oscillating and remains intact, or it continues oscillation, assisted by all sorts of feed-back from the amplifier, until it cracks into several pieces. A thorough understanding of the principle involved in neutralizing will do much to simplify the problem, and with that end in view the writer presents the following summary of his experience with dozens of circuits and tube combinations.

SINGLE-ENDED AMPLIFIERS

Starting with the usual type of crystal-controlled or self-controlled tube, it is assumed that the succeeding tube is to be operated at the same frequency. In the case of a tube acting as a frequency multiplier neutralization is obviously unnecessary, since any energy which may be fed back through the tube capacity will not damage the crystal or seriously affect operation. The discussion is equally applicable, however, whether the tube to be neutralized is directly excited by the crystal-controlled tube or is excited by a frequency multiplier tube; it also applies to any number of cascade amplifiers operating on the same frequency.

Two methods of neutralizing triodes are in common use and are indicated as "A" and "B" in Fig. 1. In "A" the neutralizing inductance L_n is placed on the plate tank of the exciting tube and is connected to the grid of the amplifier tube (to be neutralized) through the neutralizing condenser C_n . In "B," however, the neutralizing inductance is placed on the plate coil of the amplifier tube (tube to be neutralized) and is connected to the grid of that tube through the neutralizing condenser. The adjustment and theory of operation are the same in each case, and both methods have their merits. The writer prefers the second arrangement since it keeps all apparatus relating to a particular tube in one shield—an advantage where the crystal oscillator, and

perhaps each stage, is shielded. The first method, however, is preferable for a tube which is to be modulated.¹

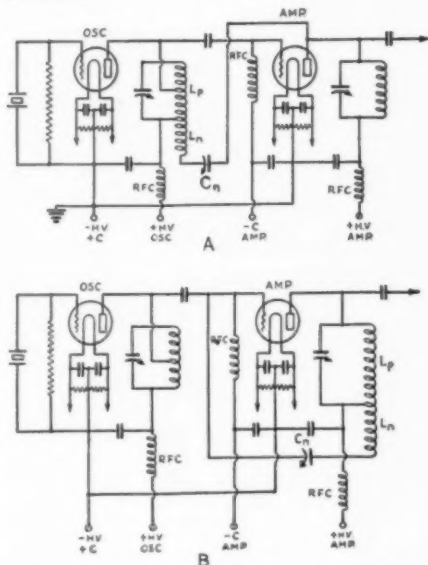


FIG. 1.—TWO METHODS OF NEUTRALIZING SINGLE-ENDED AMPLIFIERS

In A the neutralizing inductance is coupled to the tank circuit of the amplifier or oscillator preceding the stage to be neutralized. This is known as the Rice Circuit.

In B the neutralizing inductance is coupled to the plate tank of the stage to be neutralized. This arrangement has the advantage in that the complete neutralizing circuit is associated with the stage to be neutralized. This is known as the Roberts Circuit.

Now for the simplified theory of operation. In Fig. 2 the inductances and capacities in Fig. 1 have been arranged to show the equivalent circuit. It is obvious at a glance that if C_n is made equal to C_{gp} and L_n is made equal to L_p , the bridge will be in balance. Any feed-back through the inter-electrode capacity C_{gp} will be balanced by an equal feed-back of opposite phase impressed on the grid through C_n . It is realized that the actions involved in the two cases are not identical but for the sake of simplicity they are so assumed.

And there we are! In order to neutralize the

¹ Method B has another advantage. Adjustment of the neutralizing condenser has less effect on oscillator tuning. This is a particularly valuable feature in sets using self-controlled oscillators. B is O.K. for modulated amplifiers if the neutralizing condenser has sufficient spacing to prevent flash-over to the grid circuits on the modulation peaks. A fixed blocking condenser connected in series with the neutralizing condenser will help here. — EDITOR.

* Route 1, Box 441, Tucson, Arizona.

tube, we can construct our plate inductances so as to use the same number of turns in L_n as in L_p . Then by making C_n equal to C_{gp} we can be reasonably certain that the tube is neutralized, since stray capacities will usually be small enough to be neglected. However, on the lower frequency bands especially, it is usually more convenient to reduce the relative sizes of neutralizing and plate coils, making the former smaller than the latter and increasing the neutralizing capacity to balance the bridge.²

A good working rule is to make the number of turns in the neutralizing inductance half the number of turns in the plate inductance. This insures plenty of feed-back for neutralizing purposes without making the plate coil too bulky. If the neutralizing coil is too small compared to the plate coil it will be impossible to realize enough voltage to compensate for the inter-electrode feed-back. The size and number of turns for the plate coil are easily obtained; it is then necessary simply to add half that number of turns (diameter remaining the same) and the neutralizing coil is finished. Halving the number of turns reduces the inductance of L_n to approximately one-fourth that of L_p and consequently we must increase the neutralizing capacity to four times the inter-electrode capacity in order to keep the two arms of the bridge balanced. Assuming the above rule is followed (one turn in neutralizing coil for every two turns in plate coil) the necessary neutralizing capacity will be about as follows for some of the commonly used tubes:

Tube	Neut.	
	Grid-Plate Cap. C_{gp}	Cap. C_n
Type '01-A	10.0 $\mu\text{mfd.}$	40 $\mu\text{mfd.}$
" '12-A	11.0 "	44 "
" '10-	8.0 "	32 "
" '03-A	22.5 "	90 "
" '11	18.5 "	74 "
" '52	2.5 "	10 "

If other ratios of L_n to L_p are used, we need only keep in mind the relation between number of turns and inductance. The value of inductance varies approximately as the square of the number of turns. From which the following relation can be obtained:

$$C_n = \left(\frac{\text{Plate turns}}{\text{Neut. turns}} \right)^2 \times C_{gp}$$

This equation will serve adequately for a rough approximation. It is assumed that the diameters of the plate and neutralizing coils are the same.

PUSH-PULL AMPLIFIERS

A typical push-pull amplifier arrangement is shown in Fig. 3. The output of the oscillator is

² The neutralizing inductance can be included in the tank circuit, the tank condenser being connected across both L_p and L_n . This considerably simplifies mechanical construction. — EDITOR.

made symmetrical about a nodal point at its center so that each tube of the amplifier will receive its proper share of excitation. The balancing condenser, C_b , should be of a capacity value approximately equal to the plate-filament capacity of the oscillator tube. This is necessary to make equal the capacities between each end of the tank circuit and the oscillator filament. The amplifier neutralizing circuit makes a perfect capacity bridge, with the neutralizing condensers equal in

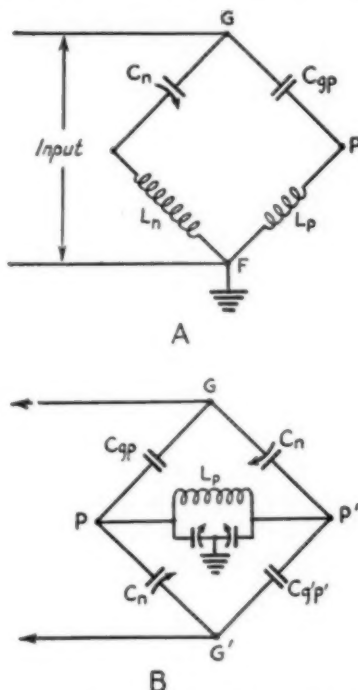


FIG. 2.—THE EQUIVALENT NEUTRALIZING CIRCUITS

A is the equivalent circuit for a single-ended amplifier and B is that of a push-pull amplifier. The latter is a perfect capacity bridge.

capacity to the grid-plate capacities of the tubes. The neutralizing circuit of a push-pull amplifier is very near ideal. The equivalent neutralizing circuit of the push-pull amplifier is shown by B of Fig. 2.

THE NEUTRALIZING ADJUSTMENT

Now for the routine of neutralizing. It is assumed that the inductance of the plate coil is of such value that it will tune to the desired frequency at some setting of the plate condenser; that the neutralizing coil contains half as many turns as the plate coil; and that the neutralizing condenser has a range such that the values given above do not lie too close to the upper or lower end of its range. That is, the neutralizing con-

denser for a Type '10, for example, should have a maximum of 50 or 60 $\mu\mu\text{fd.}$ and a minimum of 15 $\mu\mu\text{fd.}$, thus permitting some compensation for errors.

A two-turn pick-up coil connected to a flash-light bulb as described on page 13, September, 1928, *QST*, should be constructed. With the crystal (or self-controlled) tube oscillating properly, the filament of the amplifier tube should be lighted and grid excitation and bias applied. *Plate voltage must not be applied to the amplifier tube until it is properly and completely neutralized.* That statement has been printed in *QST* dozens of times, and if it were heeded it would eliminate almost every possibility of cracking a crystal. So, without plate voltage, tick the pick-up coil near the plate end of the plate inductance and rotate the plate condenser until the bulb lights. Then increase the neutralizing capacity a few degrees and retune the plate tank until the bulb again lights; the necessary change in the plate condenser will probably be slight but must be made carefully, always setting it at the point that gives maximum brilliance of the pick-up lamp. The smallest possible coupling should be used between pick-up coil and plate coil, using just sufficient coupling to cause the lamp to glow faintly when the plate tank is in resonance.

Continue increasing the neutralizing capacity in small steps, retuning the plate tank each time, until the point is reached where any further increase in the neutralizing capacity causes the lamp to go out completely. This value will usually be from 10% to 20% *less* than the values given above for C_n . Now continue increasing the neutralizing condenser, constantly retuning the plate condenser, until the point is reached at which the light again begins to glow. This higher value will be from 10% to 20% *greater* than the values given for C_n . Now set the neutralizing condenser half-way between the points where the light went out and came on, and the tube is neutralized. This value will be very close to that specified for C_n .

Plate voltage still remaining *disconnected*, let's make another test to see if neutralization is as complete as it appears to be. Disregard the neutralizing condenser, leaving it set as last specified, and rotate the plate condenser through resonance, meanwhile watching the plate milliammeter of the *preceding* tube (the one supplying excitation to the tube being neutralized). If the amplifier tube is neutralized, the needle on the meter will not change; but if the amplifier tube is not neutralized, the needle will get a slight kick when the amplifier tank goes through resonance.

Still another test, probably more accurate than either of the above, is to watch the *grid* meter of the tube being neutralized. If the tube is neutralized, there will be no deflection of this

meter when the plate tank is tuned through resonance. It is realized, however, that most amateurs do not use d.c. grid meters, and if the plate meter of the exciting tube is closely watched, complete neutralization can be secured. In any case, the flashlight method must be used at first, since the two latter methods cannot be used until neutralization has at least been approached.

If in the latter two cases either or both meters show any variation as the amplifier tank goes through resonance, the neutralizing capacity can be varied in very small steps, the amplifier tank being carefully tuned through resonance each time, until no deflection occurs. The final setting of C_n may be slightly above or below that previously found, due largely to the detuning effect of the pick-up coil.

Neutralized in this manner, the tube stays neutralized as long as L_p , L_n , and C_n remain unchanged. That is, variation of the plate condenser has no effect on neutralization. It is thus possible to choose a value of L_p which permits tuning to both the 7000- and 3500-ke. bands simply by varying the amplifier tank condenser. The writer uses a coil of 4.5 inches mean diam-

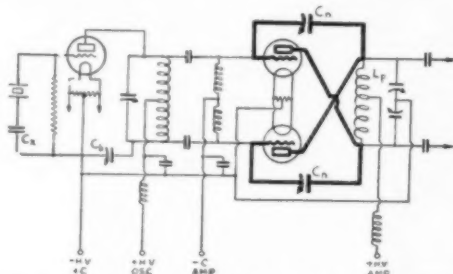


FIG. 3.—A TYPICAL NEUTRALIZED PUSH-PULL AMPLIFIER CIRCUIT

The neutralizing condensers must be adjusted simultaneously. The capacity of each is approximately equal to the grid/plate capacity of one tube.

ter, consisting of 12 turns of $\frac{1}{4}$ -inch copper tubing, using eight turns for the plate coil and four turns for the neutralizing coil. With a plate tuning condenser of 500 $\mu\text{mfd.}$ maximum, it is possible to cover both 7040 and 3600 kc., the two frequencies on which the station operates. The same plan is followed in the crystal and two buffer stages, the values of inductance being such that both frequencies are covered without changing coils. A two-point switch permits change from one crystal to the other and further simplifies matters. Probably the plate efficiency suffers under these conditions, but the flexibility secured outweighs that disadvantage.

However, if it is preferred to use separate coils for the different bands, one need only make each coil such that the neutralizing coil contains half as many turns as the plate coil, and the neutralizing condenser need never be changed, even

when coils are changed for the different bands. Such small variations as may occur will be too slight to throw the tube very far off neutralization.

The neutralizing adjustment for the push-pull amplifier is exactly the same as for the single-ended amplifier except that there are two neutralizing condensers which must be adjusted simultaneously. The two condensers should be kept at approximately equal capacity values while they are adjusted. For Type '10 tubes, this capacity is approximately 8.0 μfd . One adjustment of the neutralizing condensers will hold for all bands.

In tuning the plate tank of any amplifier, operation is desirable at the setting of plate condenser which gives maximum output, of course. This point is identical with the setting at which the tube draws lowest plate current, so that by watching the plate milliammeter, maximum output can be secured even when it is difficult to determine the actual value of output.

It should be noted that series plate feed, with the by-pass condenser and r.f. choke at the low end of the plate inductance, is indicated. It is the writer's opinion that this practice is worthy of more general adoption. When the choke is placed right next to the plate it is called on to block considerable r.f. energy, and unless plug-in chokes are used for each band, it is quite certain that some energy will leak past and find its way into the power supply. Under such conditions, perfect neutralization is almost impossible, and the danger of fracturing a crystal is materially increased. With series feed, however, the choke must block only a small amount of r.f. energy, and the low-impedance path provided by a by-pass condenser of .001 μfd . or larger will take care of all that remains. In the grid circuit it is impossible to use anything but shunt feed, and at this point it is far better to have too many turns on the choke than too few. The by-pass condenser shown from the low side of the grid choke to the center-tap helps to confine r.f. currents to the proper circuit, and since ordinary receiving condensers may be used even with large tubes, it is not an expensive addition.

In conclusion the writer acknowledges his thanks for the assistance and criticism given by M. W. Bannister, W6CDY, Station Engineer of KGAR.

Strays

W9BRU is using two Type 80 rectifiers hooked in parallel to rectify the output of his 550-volt transformer instead of the usual pair of Type '81's, and says that the voltage is higher and the current output is greater. OK, except that the rating of the tubes is being exceeded. It's worth a trial, anyhow, because a pair of '80's can be bought for only a little more than half the price of one Type '81.

ELECTION NOTICES

To all A.R.R.L. Members residing in the CENTRAL, HUDSON, NEW ENGLAND, NORTHWESTERN, ROANOKE, ROCKY MOUNTAIN and WEST GULF Divisions of A.R.R.L.:

1. You are hereby notified that an election for an A.R.R.L. Director, for the term 1931-1932, is about to be held in each of the above Divisions, in accordance with the Constitution. Your attention is invited to Sec. 1 of Article IV of the Constitution, providing for the government of A.R.R.L. affairs by a Board of Directors; Sec. 2 of Article IV, defining their eligibility; and By-Laws 10 to 19 providing for their nomination and election. Copy of the Constitution and By-Laws will be mailed any member upon request.

2. The election will take place during the month of November, 1930, on ballots which will be mailed from Headquarters in the first week of that month. The ballots for each Division will list the names of all eligible candidates nominated for the position by A.R.R.L. members residing in that Division.

3. Nominating petitions are hereby solicited. Ten or more A.R.R.L. members residing in any one Division have the privilege of nominating any member of the League in that Division as a candidate for Director therefrom. The following form for nomination is suggested:

(Place and date)

*Executive Committee,
American Radio Relay League,
Hartford, Conn.*

Gentlemen:

We, the undersigned members of the A.R.R.L. residing in the Division, hereby nominate of as a candidate for Director from this Division for the 1931-1932 term.

(Signatures and addresses)

The signers must be League members in good standing. The nominee must be a League member in good standing and must be without commercial radio connections. His complete name and address should be given. All such petitions must be filed at the headquarters office of the League in Hartford, Conn., by noon of the first day of November, 1930. There is no limit on the number of petitions that may be filed, but no member shall append his signature to more than one such petition.

4. Present Directors from these Divisions are as follows: Central, Mr. D. J. Angus, W9CYQ, Indianapolis, elected in April, 1930, to fill unexpired remainder of term of late Clyde E. Darr; Hudson, Dr. A. Lafayette Walsh, W2BW, New

(Continued on page 78)

Preparing an Article for QST

By James J. Lamb, Technical Editor

AT least once in the career of every true ham comes the urge to dash off something he just knows "ought to be in QST." Perhaps it is just a little squib on a new constructional kink and then again it may be an exhaustive treatment of transmitter design — or just a wail for "Correspondence" on some such moot question as *Long CQs* or *The QSL Problem*. Whatever the subject, the urge is a good one and should be followed by action. However, most of the ideas die aborning and the stories never arrive in Hartford. It is our hunch that the reason for this failure to come through with the article is not that the idea wasn't any good in the first place — the same idea invariably shows up with some other fellow's name on it — but that the article was never started because of the inertia of tackling the job of writing. It is the purpose here to give a few hints on the making of an article in the hope that this writing business can be made less obnoxious

on paper in the form of a rough outline, arranging the topics in some sort of logical sequence. This will forestall scrambling up the article when the actual writing is begun and guarantee against the omission of important features. If the subject is to be a receiver, don't start off with the output circuit, then jump to the antenna coupling, next hop to the audio amplifier and finally wind up with the detector circuit. Here is a good type of general outline:

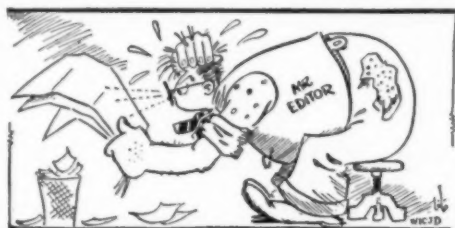
1. Introduction: Give an idea of the purpose of the article and outline its scope. Mention unusual features and advantages of the equipment (or experiment) to be described. The introduction "sells" the article to the reader. If he isn't interested by the opening paragraph he probably turns the page without reading further.

2. General description: If the subject is a piece of apparatus, such as a transmitter or receiver, give a short word-picture of its makeup. Something like this, "The receiver has a stage of tuned radio-frequency amplification, a screen-grid space-charge detector and a single stage of peaked audio-frequency amplification. It may be operated with either a.c. or d.c. filament supply and has a continuous frequency range from 1.7 to 80.5 megacycles. The set is completely shielded and weighs 8.5 pounds." (This is a fictitious receiver, as far as I know, but might work at that.)

3. Detailed construction: (a) The chassis and cabinet. Give all essential dimensions and mechanical specifications. (b) Circuit sections. Start with the input circuit and work up to the output circuit. Give all essential specifications, particularly for the coils and condensers. The coil specifications should be listed in a "coil table." Specify the diameter of the form, the exact number of turns, spacing between turns and between coils on the same form, and frequency range — for each coil. The complete schematic diagram should be given. Do not mark the condenser capacitances or any other specifications on the drawing itself. Indicate each part by lettering on the drawing and make up a list of specifications on a separate sheet. Follow the method always used in QST. Be sure to make the description complete — and carefully check everything.

Point out possible pit-falls and precautions which must be taken. If you ran into troubles others are likely to do the same.

4. Operation: Describe the adjustment procedure you have found most satisfactory. Call especial attention to any adjustments of an unusual nature.



... wild guessing on the part of authors — and wild hair-pulling on the part of editors.

to hams who have ideas which the rest of us want to know about but can't use until we see them in QST.

The first thing necessary, of course, is to have clear in your own mind what you want to tell. If your idea is all befogged with uncertainty before it gets on paper, what chance is there for anyone else to get useful information from it? If there are theories about the transmitter or receiver circuit which you don't have clearly in mind, dig through the Handbook and back files of QST and find out what already has been published about them. It often happens that a lack of understanding of fundamentals is responsible for wild guessing on the part of authors — and wild hair-pulling on the part of editors.

If you can't be sure of the theory behind the thing, leave out the theory part and stick to describing the construction and performance.

MAKE AN OUTLINE

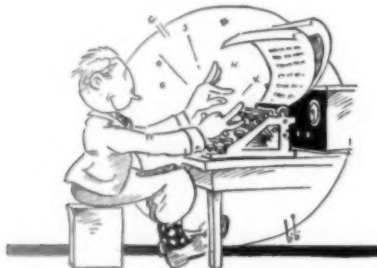
Once you have a clear mental picture of the idea as a whole, crystalize it by putting it down

5. Conclusion: Describe what has been accomplished with the apparatus and suggest possible further improvements or other adaptations.

So much for the outline. Now for the actual writing of the article.

WRITING THE ARTICLE

Once the author's thoughts have been crystallized and logically marshalled, the expansion of the outline into the article itself is comparatively easy. Contrary to general belief, the composition



... the expansion of the outline into the article itself is comparatively easy.

of the article does not require a particular talent for writing or an extensive knowledge of the dictionary. The best technical writer is one who writes simply. Use short sentences and avoid hackneyed phrases. Beware of ambiguity. That is, do not get yourself into involved expressions which may be misunderstood. Here is one horrible example of the ambiguity resulting from poor composition:

"The grid bias and plate current are often wrong, due to the fact that it is not properly adjusted." What is not properly adjusted, the grid bias or the plate current? And beware of such writer's itch as "due to the fact that." "Because" is much simpler and means more. Long sentences should not be attempted by an inexperienced writer and even the competent should use them economically, especially in technical writing. Beware of unusual words. Remember that the purpose of the article is to convey information to others, not to impress them with the magnificence of your vocabulary.

A working acquaintance with grammar and rhetoric is valuable. There is one book which could be used to advantage by anyone really interested in writing well on technical subjects. It is "English and Science" by Philip B. McDonald, reviewed in *QST*, Jan., 1930. I find this book a constant source of practical aid to the business of writing and editing. Its nominal cost represents a sound investment for the technical writer.

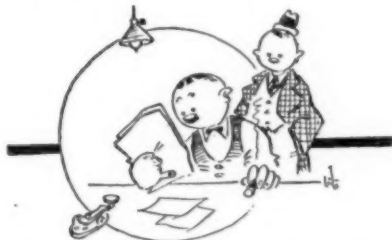
The article preferably should be typed with double spacing between the lines. The double spacing is absolutely essential for editing. If

the article must be written in long-hand, make the writing legible and leave a double space between lines. Always remember that editors are very much like normal people: They are apt to be influenced by first impressions. A neat and legible article is going to get attention more readily than a messy illegible one. Write on only one side of each sheet and number the sheets.

DIAGRAMS AND PHOTOGRAPHS

Make each diagram or sketch on a separate page. Do not draw them in the manuscript because the typed pages go to the printer and the diagrams go to the draftsman. Number the diagrams and refer to them by their numbers. The circuit diagrams or other sketches can be penciled. Ink drawings are not necessary because our own draftsman does the drawings from which the plates are made.

Good illustrations often "make" an article and most apparatus articles are useless without them. Nothing "sells" an article to both the editor and the reader as do good photographs. Remember that the photographs must be reproduced by printing and are bound to lose clarity in the process. The originals should be at least of post-card size and preferably larger. The ones used in Headquarters articles are 8 inches by 10 inches and are made by a commercial photographer. Several articles on getting good apparatus photographs have appeared in *QST*: "Photographs for *QST*," March, 1929, and "How To Photograph Your Transmitter By Electric Lights," June, 1929. A reprint of the first article will be sent on request. The main idea is that the photographs should be "hard," showing up the details, but free of heavy shadows. Flash-light photographs and those taken in direct



... hand it over to a ham friend with the request that he give his criticisms.

sunlight are generally unsatisfactory. Portrait photographers are notoriously poor at making satisfactory apparatus pictures. They are addicted to having everything out of focus and must be brow-beaten into making "hard" negatives. Commercial photographers are more amenable to suggestion.

Do not attempt any retouching on the photographs. If retouching should be necessary it will be done by our staff. Above all things, do not

type on the back of a photograph, or mark it with ink. The typing may show through — and the markings may not be satisfactory from the editorial point of view.

When the article has been finished, hand it over to a ham friend with the request that he give his criticisms. If there isn't a ham available perhaps you can get your high-school English teacher to go through the story. The teacher may not know what it is all about but can point out errors in construction and grammar. When the article has been modified to the satisfaction of everyone, it is ready for mailing to *QST*.

It is best to mail the complete article, photographs and diagrams included, in an envelope sufficiently large to accommodate all the material without folding. There is no real objection to folding the typewritten pages or diagram sheets, of course, but do not fold the photographs. Be sure that your name, call-sign, and complete address are attached to the manuscript. Call-letters alone are insufficient. All technical articles should be addressed to the Technical Editor. Your article will be acknowledged on receipt but a promise of definite publication cannot be made before the article has been gone over thoroughly.

If you are not reasonably certain that the subject of a contemplated article is suitable for publication, it is a good idea to send in an outline before starting the article itself. This procedure is followed by some of *QST*'s best contributors.

Since *QST* is the official organ of the A.R.R.L., a non-commercial organization, and is "of, by and for the amateur," articles are regarded as contributions to the advancement of amateur radio and no payment is made for them. This has been *QST*'s inviolable policy through all the years of its existence and is in conformity with



... a lot of good ham contributions on their way to Hartford.

the policies of the publications of the leading technical societies.

There are no *QST* articles quite as fine as those *QST* receives from its amateur membership. We hope that the suggestions that have been made will start a lot of pent up contributions on their way to Hartford.

Doings at Headquarters

AUGUST and September found a number of Hq. members away from the office, either on vacation and business trips or convention round ups. Budlong left in late August to attend the Northwestern Division Convention at Spokane, Washington, and arrived back in Hartford in mid-September, after stopping over in several midwestern cities and enjoying hamfests with A.R.R.L. members. Dave Houghton left in



SKIPPER HEBERT ABOARD THE "YO-HO"

the first week of September to make a survey of *QST* circulation and newsstand sales. His itinerary included most large cities in the east and central states. He is due back at Hq. the last week in September.

Jim Lamb and George Grammer of the Technical Department attended the I.R.E. Convention at Toronto during August. Many new acquaintances were made, not to mention renewing old ones and picking up useful material for *QST*'s pages.

Ev. Battey went to the Maine Convention, held in Portland during August. Warner and Rodimon travelled to Dayton for the Central Division Convention.

"Bob" Parmenter, "rp" of W1MK, drove to Chicago during his vacation.

Probably no face is more familiar in amateur radio circles than that of A. A. Hebert, Treasurer-Fieldman of the League. How many recognize him all "dekked out" ready for a sail? This, by the way, is just one more of his hobbies.

The Communications Department has just put the finishing touches on the new 500-watt crystal-control transmitter at W1MK. We are hoping to have a description of this transmitter in *QST* before long.

— C. C. R.

Standard Frequency System News

W9XAM in Operation—Pacific Coast Station to Start November First

THE completion of the new A.R.R.L. Standard Frequency System is in sight. As this is being written (it's a hot night in August) word comes from the boys at Elgin that their new frequency standard has been received from the Bureau of Standards, where it was given its official calibration, and that the final touches are being given to W9XAM's 500-watt standard frequency transmitter. Transmissions will have begun before this is printed and it is hoped that they will be put to the good use they deserve. The accuracy of these transmissions will be well up to expectations, since the Bureau of Standards calibration on the frequency standard is 100,000 kc. or accurate to within less than 1 cycle in 100 kilocycles.

The license for the Pacific Coast Station has not been issued at this writing but assurances are given that everything will be set for inauguration of the schedules to be transmitted by Harold Peery and his gang by November 1. Tentative schedules for November are given this month for the benefit of the gang who live a month's mail time from QST factory. Although the complete call of this station cannot be given at this time there should be no difficulty in identifying it over the air. When you hear a "W6X-" sending S.F. signals on the schedules given and using the characteristic letter "F" you will know that it is the A.R.R.L. Pacific Coast S.F. Station. The complete call will be sent out in a W1MK broadcast as soon as it is known and will be published in November QST. The standard for this station is completed and we expect notice of its calibration from the Bureau any day.

W1AXV is discontinuing the QRG service effective October 1 to allow the transmission of additional standard frequency schedules from Round Hill. Howard Chinn and his gang have come to the conclusion that the time required for the direct QRG service can be employed to better advantage in transmitting more schedules. Although reports on W1XP-W1AXV transmissions are becoming more and more numerous there aren't enough yet. Mark the dates of the following schedules on your station calendar and use as many of them as you can. Do not take any chance of having that new dynatron frequency meter go off calibration. Check it at every opportunity.

DATES OF TRANSMISSIONS		
Date	Schedule	Station
Oct. 3, Friday	A	W1XP (W1AXV)
	B	W9XAM (W9SL)
Oct. 10, Friday	BB	W1XP
	B	W9XAM
Oct. 12, Sunday	C	W9XAM
Oct. 17, Friday	B	W1XP
	A	W9XAM
Oct. 18, Saturday	BX	W9XAM
Oct. 19, Sunday	C	W1XP
	BB	W9XAM
Oct. 24, Friday	A	W1XP
	B	W9XAM
Oct. 31, Friday	BB	W1XP
	B	W9XAM
Nov. 1, Saturday	BX	W6X-
Nov. 2, Sunday	C	W9XAM
Nov. 7, Friday	BB	W6X-
	B	W1XP
	A	W9XAM
Nov. 8, Saturday	BX	W9XAM
Nov. 9, Sunday	C	W1XP
	BB	W9XAM
	C	W6X-
Nov. 14, Friday	C	W6X-
Nov. 21, Friday	A	W1XP
	B	W9XAM
	B	W6X-
Nov. 28, Friday	BB	W1XP
	B	W9XAM
	A	W6X-
Nov. 29, Saturday	BX	W6X-

STANDARD FREQUENCY SCHEDULES					
Friday Evenings			Friday and Sunday Afternoons		
Schedule and Frequency			Schedule and Frequency		
Time (p.m.)	A	B	Time (p.m.)	BB	C
	kc.	kc.		kc.	kc.
8:00	3500	7000	4:00	7000	14,000
8:08	3550	7100	4:08	7100	14,100
8:16	3600	7200	4:16	7200	14,200
8:24	3700	7300	4:24	7300	14,300
8:32	3800		4:32		14,400
8:40	3900				
8:48	4000				

Saturday Morning	
Schedule and Frequency	
Time (a.m.)	BX
	kc.
	4:00 7000
	4:08 7100
	4:16 7200
	4:24 7300

The time specified in the schedules is local standard time at the transmitting station. W1XP uses Eastern Standard Time, W9XAM, Central Standard Time, and W6X-, Pacific Standard Time. Schedule BB transmitted by W1XP is

(Continued on page 80)

Experimenters' Section

TUNED ANTENNAS FOR RECEIVING

AMATEUR radio seems to pass through cycles much after the manner of the earth and its seasons. Ten years ago the receiver without antenna tuning would have been unthinkable — five or six years later the reverse was true. The general adoption of the Hertz antenna for transmission suggested the use of the same type of antenna for reception to a number of experimenters, as has been reported in *QST* at various times, and all who have tried it report results beyond their expectations. Tuned antenna systems are being revived.

Aside from the increase in signal strength which a tuned receiving antenna can be expected to give, there may be further benefits for those who are bothered (a mild term!) with power QRM. Read what Don B. Knock, VK6NK-VK2NO, of Wyndham Meatworks, N. W. Australia, has to say about the doublet in this connection:

"I don't usually rush to pen and paper about things that happen to me, but in this case I feel that it may be of help to others who may be facing the ham's worst *bête noir* — power QRM! This extensive meatworks in the far northwest of the wildest country in the world is a little city of its own, and it carries with it somewhat more than the average city's complement of power induction at high — and a truly awful amount at low — frequencies.

"Early this year I arrived here to establish a system of radio communication between the works and mobile launch and car stations. There was only one possible location for the control station, which was unfortunately right in the middle of things — less than 100 feet from a power house with two 100-kw. 230-volt d.c. generators and 50 odd motors. Hitching up a modern screened tuned-r.f. receiver confirmed my worst fears — the racket was terrible. But something had to be done about it. Furthermore, having been a ham two-thirds of my life, I wanted to at least bridge the 2000 miles between here and the gang down south.

"A vertical aerial consisting of single lead-covered wire was erected with the inside wire as the aerial and the lead connected through a variable resistance to earth. This served moderately well, cutting the noise level down about 40%, and it is remarkable what a great amount of noise a pair of long-trained ham ears can work through. Still, on 7000 kc. it was often too strong to be comfortable. Then I came across the reference to a doublet designed for reception on 7000 kc. in *QST*.¹ Down came the lead-covered

arrangement and the doublet with its twisted-flex feeders erected. The result absolutely astounded me. The noise level went down to a mere whisper on 7000 kc. and the signal strength actually went up considerably. At 14,000 kc. the receiver is so devoid of power QRM that if there are no signals to be heard on the band at the time one is inclined to suspect the receiver of being 'dud.' It tells a different story at signal peak periods, though.

"The receiver I use employs a tuned screen-grid r.f. stage with the aerial coupled through a three-plate midget variable condenser direct to the grid of the r.f. tube. With this receiving doublet, one feeder is connected to this and the other to the receiver chassis and screening. One side of the doublet is vertical and the other directly underneath in the form of a horizontal

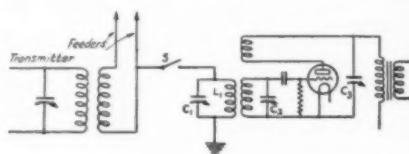


FIG. 1

circle — the feeders running horizontally from the mid-point into the receiving rooms. I found that by erecting the doublet in this fashion far better results are obtained than if slung in the usual horizontal manner. Since erecting this, I am able to copy an R2 signal quite normally, and this with the power house batting out d.c. at a few hundred kilowatts only a few feet away, accompanied by the sparking commutators of sundry motors operating machinery, etc. It sounds like a fairy story but is true, and I am certain that in the future reception in any city full of power leaks holds no terrors for me. Where I go, this doublet system goes.

"After this I shall feel like the Old Man if I QSO many hams who come back too often with 'Sri OM, power QRM too bad.' My hearty regards to the originator of the idea and *QST*."

So much for the doublet. Lyle Geary, VE5AW, of Whitehorse, Yukon Territory, writes as follows concerning the Zeppelin for receiving:

"The article on page 48, April *QST*, entitled 'Ham Band Antenna' prompted me to write this note. Here at VE5AW we have been using a somewhat similar arrangement except that we are using a Zeppelin antenna instead of the current-fed system described by Colonel Foster some time ago.¹

"An antenna coil of four turns of bell wire was

¹"The Doublet for Receiving," Experimenters' Section *QST*, September, 1929.

made to slide to or from the grid coil and the feeders are tuned with a pair of 250- μ fd. variables, which are controlled by one dial for ease in tuning. After tuning in a signal the feeder dial is varied from maximum to minimum until the receiver is about to stop oscillating (resonance) and the resulting signal strength is marvellous, sometimes being as much as 40% greater than with the usual arrangement. Signals of the usual R5 to R6 can be brought up to a full R8.

"Stations may be separated very well by varying the feeder condensers and primary coil; and the coupling may be made extra close without much effect on the oscillation of the set.

"I should like to hear from any of the gang who have tried this stunt — and possibly others have, although I have never seen it mentioned. The Zepp has a fundamental of 7200 kc. and the feeders are each 46 feet in length."

A third arrangement is suggested by L. M. Wilson, VK2LM, of Malboona, N. S. W. Here is his letter:

"On the 14-mc. band I use a full-wave Zepp with half-wave feeders. The receiver is 3-coil (tube-base variety) with throttle condenser control of regeneration. The aerial coupling coil is 12 turns wound round a tube socket. For receiving I close switch marked S, Fig. 1, thus using part of the Zepp as an antenna. By placing the condenser C_1 across the coil L_1 , and providing L_1 has a suitable number of turns, a very large increase in signal strength is obtained.

"This arrangement properly adjusted gives more increase in signal strength than one stage of tuned screen-grid r.f. It is the only receiver I have ever seen on which it is possible to copy signals which are unreadable with the straight three coil arrangement.

"The operation is as follows; adjust C_1 until a resonance click is heard in the phones. Then adjust the regeneration condenser, C_2 , until the same resonance click is sharp. Now forget about the reaction condenser C_3 and manipulate C_1 to keep the receiver oscillating and C_2 to cover the band. It is important to note that unless L_1 has the right inductance to give the resonance click referred to the addition of C_1 to the receiver will not benefit reception at all.

"I have noticed also that even when the switch (S) is open and the C_1 - L_1 combination is three feet from the transmitter there is likely to be a heavy absorption of feeder current at certain C_1 - L_1 settings."

THE SINGLE-WIRE-FED HERTZ

One difficulty with the single-wire feeder is that the system sometimes refuses to act as a Hertz antenna with a non-radiating feeder, but insists on gumming things up by acting as a simple grounded antenna, directly coupled to the oscillator. If there is no direct ground on the filament center-tap, r.f. may feed back through

the power supply and eventually find its way to ground through the house wiring, which is not so good. Evidently this is what happened to W8OG when he tried this type of feeder. His letter follows:

"Perhaps this is 'old stuff' by now, but again it may help some of the fellows who are trying to get a good d.c. note with a Hertz antenna per Windom in September, 1929, QST.

"The space here for an antenna is very limited and it must be put up in such a manner as to almost prohibit, on account of the short feeders, Zepp feed. When the above article came out an antenna was constructed according to the charts — and what a fine a.c. and r.a.c. note I had. Practically everything was tried to get the same d.c. note as with the antenna feeder disconnected, but unless the antenna was run quite a bit off its fundamental, the r.a.c. was still present. When run about 50 or 75 kilocycles off the fundamental I would usually get near d.c. reports, but the efficiency was very low, due perhaps to the feeder trying to act as the antenna.

"Various sizes of chokes were tried, varying in turns from 50 to 300, but none of them helped. Evidently something was seriously wrong, so the antenna was taken down again to determine if all measurements were *exactly* right. They were, so work started on the set. It was noticed, by touching a screwdriver on the filament terminals, that some r.f. feedback was present. Chokes were tried in the filament leads but only served to cut down the filament voltage and helped very little. Then a 'misfit' choke of about 75 or 80 turns was put in the negative high voltage lead. Lo and behold, the carrier was pure d.c. and has been ever since. The size of the choke does not seem to make very much difference, and the antenna can be run smack on the fundamental. The carrier is pure d.c. and has been so reported by every station, not 75% or so, but *every* station I have worked."

— D. G. Ream

AN A.C. COMBINATION RECEIVER

By H. A. Wall, W9EIV

The receiver to be described is a combination of a traffic tuner, a short-wave broadcast receiver, and a broadcast band receiver. As a traffic tuner, the amateur bands are spread over the full scale. As a short wave broadcast receiver, hair-line selectivity is obtained. As a broadcast receiver sufficient volume is obtained to operate a loud-speaker for a small room.

As will be noted by reference to the diagram, Fig. 2, the set employs four tubes. The first is a Type '24, used as a partially untuned r.f. amplifier. The second is also a '24 used as a grid-leak detector. The third is likewise a '24, as a resistance-coupled amplifier, and the fourth is a Type '27, used to couple the headphones or speaker to the screen-grid stage of audio-frequency amplification.

Regeneration is controlled by a 50,000-ohm variable resistor varying the screen-grid voltage on the detector tube. Volume is controlled by a similar resistance which varies the screen-grid voltage on the first audio amplifier.

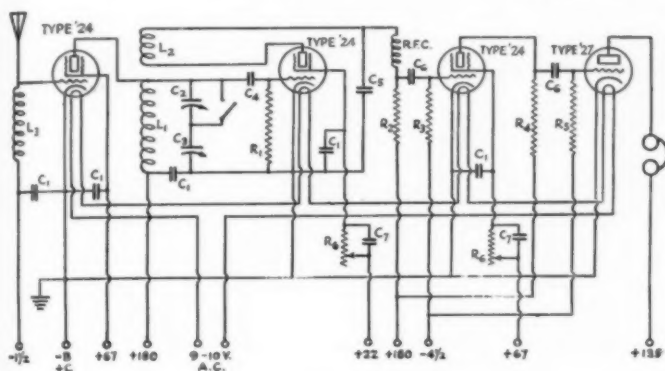


FIG. 2

- C_1 — 6000 μfd .
 C_2 — 50- μfd . midyet condenser.
 C_3 — 350 μfd .
 C_4 — 100 μfd .
 C_5 — 250 μfd .
 C_6 — 6000 μfd .
 C_7 — 1.0 μfd .

- | | | |
|---------------------|---------|-----------------|
| L_1 | L_2 | L_3 |
| 7000 kc... 17 turns | 7 turns | 34 turns |
| 3500 kc... 34 " | 9 " | 45 " |
| 1750 kc... 45 " | 11 " | 100 " (No. 32) |
| B.C. band .70 " | 18 " | Broadcast choke |
- All wound with No. 24 enamelled wire on tube bases except as noted.
 See text for construction of broadcast coil.
 R_1 — 5 megohms.
 R_2 — 250,000 ohms.
 R_3 — 100,000 ohms.
 R_4 — 250,000 ohms.
 R_5 — 9.5 megohms.
 R_6 — 100,000-ohm variable resistor.

Tuning is accomplished by a standard 23-plate condenser, full size. In series with it is a 50- μfd . variable, with a switch to cut it out when the set is used for broadcast reception. The reason for this tuning arrangement can readily be understood by noting the formula for capacities in series when one capacity is large and the other is relatively small. If the large capacity is varied, the overall capacity change is small, and the maximum capacity depends largely on the capacity of the smaller condenser.

The coils are wound with No. 24 enamelled wire on standard tube bases. The broadcast-band coil is wound on a piece of tubing which will just fit over a tube base, and is cemented fast with DuPont cement. The parts are mounted on a hard-rubber sub-panel, 7" by 18", and all wiring is underneath. Filament wires are cabled separately, as are also the power leads.

The radio-frequency amplifier is shielded with copper, and the whole outfit is housed in a metal cabinet. All bias voltages are from dry batteries. Plate supply is from "B" eliminator supplying 150 volts. Heater current is obtained by connecting the three windings of a filament-supply transformer (5, 2 1/2 and 1 1/2 volts) in series mak-

ing 9 volts. All four heaters are connected in series and left floating.

Dimensions of the plug-in coils are the same as for any receiver, and should be wound a trifle large, taking off a turn or two later if necessary.

Every conceivable combination of constants for all parts of the circuit were tried, and those shown in connection with the diagram were found to give the best results.

The amplifier is not of the peaked variety because of its effect on phone reception, but a peaked amplifier could easily be used. Reference to the diagram will tell everything else.

THE SPACE-CHARGE '22 DETECTOR

While a great deal of interest is being shown in screen-grid tubes as detectors, the space-charge arrangement has been generally neglected in favor of straight screen-grid detection. Now and then we hear of experimenters obtaining good results with space charge detection, however, and one of these is George Leander Smith, 251 South Hill St., Los Angeles. Mr. Smith has been trying various circuits with a view to find-

ing the best combination of constants, and the one shown in Fig. 3 seems to be about the best.

Coil and condenser sizes will depend on the frequencies to be covered, and do not differ from those used with other detectors. Factory-wound coils have been found to function very nicely, although, of course, not generally the right size

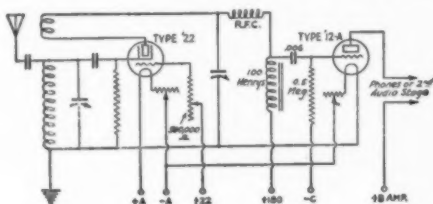


FIG. 3

if the amateur bands are to be spread over the dial. If the usual precautions as to elimination of losses are observed in laying out the receiver the tickler will require rather less turns than is the case with other detectors, although the exact number does not seem to be critical. Shielding has not been found to be beneficial, and in fact

seems to introduce losses at the higher frequencies and prevents the detector from oscillating.

Many forms of coupling between the detector and audio amplifier were tried, and the impedance coupling shown in the diagram is one of the most satisfactory. Good results have been secured without any audio amplifier at all, the phones (Baldwins) being inserted directly in the plate circuit of the '22. Microphonic noises are reduced by the use of good quality resistors, impedance coupling between detector and amplifier, and an audio tube in the first stage which operates at low filament temperature, such as the Type '12-A.

Mr. Smith writes that the space-charge detector is noticeably more sensitive than a three-electrode tube, and although it is sometimes a little tricky to get going, is well worth a trial. The drain on both filament and plate batteries is low, which makes it economical to operate.

FILAMENT BY-PASS CONDENSERS

The following letter from Bayard Allen, W3ATJ, raises an interesting question regarding filament by-pass condensers:

"In building a new transmitter, a high-C Hartley with about 750 volts on the plate, I was troubled with bad r.f. feed-back into the filament of the Type '10 oscillator. This was especially noticeable on 14 mc. because every time the key was pressed the '10 lighted very brightly. I removed the .002 by-pass condensers across the filament leads, and that eliminated the trouble very nicely.

"Not having a double-pole switch handy and wishing to operate on all bands, I decided to try the thing without the condensers on other bands. As my filter condensers had blown a few days before and my new ones had not yet arrived I was using r.a.c. and obtaining good results, so tuned the transmitter to 3500 kc. and tried it without the by-pass condensers. The set seemed to function as well as it did with the condensers, but every station I worked commented on the sharpness of my wave, and practically all of them said that the wave was almost as sharp as xtal d.c. and unusually sharp for plain r.a.c. I do not have any method of measuring this width, so thought that perhaps you could check up on it and if it is true and is not just a freak condition at my station, surely this information would be valuable in sharpening some of the terrible r.a.c. and a.c. notes we hear on the air."

When and why are filament by-pass condensers necessary? In W3ATJ's case the filament wiring and the by-pass condensers probably formed a loop which was nearly resonant to the transmitting frequency, since the current flowing in the leads was sufficient to cause a noticeable difference in the filament temperature when the key was pressed.

We rather think that the use of filament by-pass condensers is a heritage from the dark ages

of c.w. — one of those things that are done simply because they have always been done, and not because there is any real necessity for them. We found that there was a real advantage in omitting filament by-pass condensers in the push-pull transmitter described in June *QST*, and the omission may be just as helpful with a single-tube transmitter.

Since the filament lead in an oscillatory circuit is brought out from a voltage node, there should be no r.f. potential at the filament which can be attributed to the external circuit. Lack of symmetry between the two halves of the filament itself may cause an r.f. potential difference across parts of the filament because of its position in the electric field within the tube, but it is difficult to see where the addition of by-pass condensers will aid such a condition because they simply lower the reactance of the external circuit and so help the flow of unwanted r.f. in the filament, whereas it would be better to choke it off. Therefore it would seem better to leave the condensers out of the circuit entirely because they are useless so far as the oscillatory circuit is concerned, and simply aggravate a bad condition if r.f. current is induced in the filament.

We should be glad to hear further from experimenters who have occasion to investigate this subject.

A USEFUL LAMP BANK

Myrton Billings, W2BIV, sends us some information on a lamp bank which has proved to be a very handy thing to have around the shack. A quantity of lamps, sockets, and single-pole

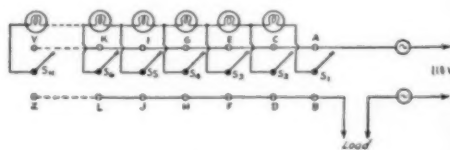


FIG. 4

double-throw switches, all of which can be obtained cheaply at the "5 and 10" stores, are required. The number of lamps in the bank can be made as small or large as desired, but the larger the number the more flexible is the bank.

The connections are shown in Fig. 4. By proper switching it is possible to connect the lamps in series, parallel, or series-parallel in a great many different arrangements, depending of course on the number of lamps in the bank. A dozen or more lamps will be useful.

Fig. 5 shows a few of the possible combinations. The series connection is obtained by throwing S_1 , Fig. 4, to "A", counting off the number of lamps wanted in series, and throwing the corresponding switch to the opposite side. All other switches must be open. To place four lamps in series, as in

Fig. 5, S_1 would be at "A" and S_5 at "J". If all the lamps in the bank are to be series connected, S_1 is at "A" and S_n at "Z."

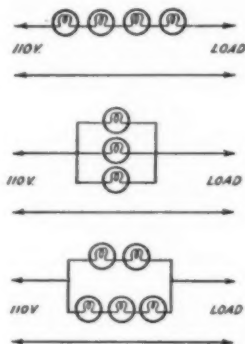
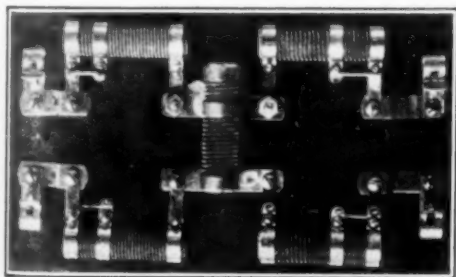


FIG. 5

To place any number of lamps in parallel, alternate switches are thrown in opposite directions. The three in parallel shown in Fig. 5 would be obtained by throwing S_1 to "A," S_2 to "D," S_3 to "E" and S_4 to "H," all other switches being open. Any number could be placed in parallel by following the same procedure.

For the series-parallel arrangement each series group is connected in as described above, with alternate switching between groups. For instance, the arrangement shown in Fig. 5 could be obtained by throwing S_1 to "A," S_3 to "F," and S_5 to "K." Other combinations will readily suggest themselves to the experimenter.

Lamp banks are useful in any case where a variable resistor is needed. One application suggested by W2BIV is in reducing plate voltage on a transmitter while making tests or adjustments. The secondary voltage of the plate transformer can be reduced to practically any desired value lower than the rated voltage by the use of a



AN EASILY-CONSTRUCTED LINE PAD

For matching a 500-ohm line to a 200-ohm microphone transformer.

suitable number of lamps in series, parallel, or series-parallel arrangements, on the primary side of the transformer.

LINE PAD FOR REMOTE CONTROL

The following letter from R. H. McConnell, KGFV, Ravenna, Nebr., will be interesting to amateurs connected with broadcasting stations or installation of sound systems, as well as phone men:

"During the past year I have had many requests for information on how to construct a line pad for remote control work. These, of course, can be purchased but are quite expensive, and we have succeeded in constructing one that works very well and which costs less than \$5.00.

"The resistors were purchased from Electrad, Inc. These folks will set the adjustable taps at whatever resistance you require if you instruct them to do so when ordering the resistors. To make this line pad, five resistors, four Fahnestock clips, four metal mounting brackets, two straight mounting brackets and one 5 x 7 bakelite or hard rubber panel are required. The photo shows method of mounting resistors and how the finished product looks. Fig. 6 gives the values of resistors and proper connections to line and amplifier.

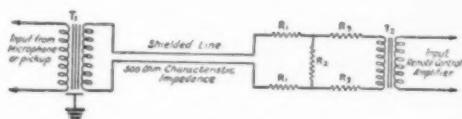


FIG. 6

- T_1 — Tube-to-line transformer.
- T_2 — Microphone transformer.
- R_1 — 226 ohms.
- R_2 — 74 ohms.
- R_3 — 67 ohms.

"The line between the output of the tube-to-line transformer and the input to the remote-control amplifier should be shielded and the shield grounded. Lead-covered cable is best for this work, but if not available BX will do. The cases of both tube-to-line transformer and microphone transformer should be grounded.

"This line pad is being used with very good success by several broadcasting stations and public-address and theatre sound systems in Nebraska."

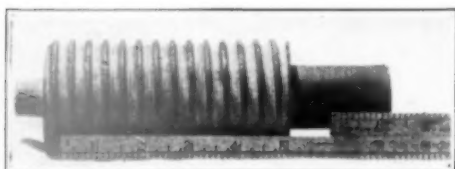
WINDING FORM FOR COPPER TUBING

Here is a device which a friend of mine evolved one day while watching me curl copper tubing on the traditional piece of 3-inch pipe.

This coil winding form (wood) is $2\frac{1}{2}$ inches in diameter with grooves to accommodate $\frac{1}{4}$ -inch tubing and giving automatic — so to speak — spacing of turns. It has the unique advantage that the copper tubing need not be straightened before winding. When the required number of turns has been wound the coil is then unscrewed from the form, and is ready to be installed in the transmitter.

Such a form can be procured at small cost from a wood-turning shop.

— John C. Stadler, VE2AP



THE COIL FORM

LEAD-IN INSULATORS

One of the most effective and inexpensive forms of lead-in insulator is the familiar Pyrex custard bowl, or a pair of them on each side of a board with a brass rod running through. The difficulty is to drill the necessary holes through the cups, a difficulty which is perhaps more imaginary than real. Several methods of drilling glass have been suggested previously in *QST*, and here is another one called to our attention by Ray West, W1AMF.

Procure a round file of the same diameter as the hole to be drilled and break it into pieces about an inch and a half long. One of the pieces is placed in a bit brace and used as a drill. The cutting end should be ground down to an edge similar to that on a cold chisel for best results. Put a little turpentine in the Pyrex cup turn the brace in the same way as in boring wood. Slow speed with a little pressure seems to work best. If the file does not cut when rotating the brace in the usual manner try turning it the other way. A hole can be drilled through the cup in a minute or two.

To enlarge a hole already drilled, use a file of the proper size and, with little or no pressure, rotate the file backwards, that is, so the spirals will tend to back out of the hole.

A SIMPLE PRIMARY REACTOR

John Oigard, Jr., W9ASW, needed a means of controlling the filament voltage on his Type '66 rectifiers and constructed a primary reactor which did the work very nicely. The filament transformer, which was homemade, was built to deliver 10 amperes at three volts, and the problem was to cut the voltage down to 2.5 for the rectifier filaments and still allow some adjustment to take care of variations in line voltage.

A dummy load was first made up to take 10 amperes at three volts to take the place of the filaments while adjusting the reactor. The reactor itself and its connections are shown in Fig. 7. The iron core is a $1\frac{1}{2} \times 6$ bolt, although any piece of iron or bundle of iron wire of about the same dimensions will do. The winding form is a piece of fibre tubing $1\frac{1}{2}$ inches inside diameter

and 6 inches long, with end pieces of fibre or wood fitted over it to hold the winding in place.

With the core inserted all the way in the form, No. 20 d.c.c. wire is wound on until the voltage across the dummy load, as shown by a voltmeter, is two volts. About 450 turns were sufficient in this particular case. When the core is pulled entirely out the inductance of the reactor is very low and the secondary voltage is practically the same as when the primary of the transformer is connected directly across the line. It is possible, therefore, to regulate the secondary voltage to any value between 2 and 3 volts, which will take care of rather drastic changes in line voltage.

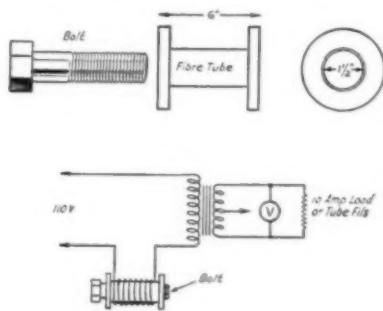


FIG. 7

The same idea can be applied to other transformers as well, but the size of the reactor may require some modification to take care of different loads. The wire in the coil must of course be large enough to carry the primary current of the transformer without excessive heating.

Huber Resigns

LOUIS R. HUBER, W9DOA, Director of the A.R.R.L. Midwest Division, has moved to Seattle for the purpose of attending the University of Washington for the next two years. As a result of his removal he has felt it necessary to present his resignation as an A.R.R.L. Director. The resignation cannot become effective until his successor is chosen. Special notice is now appearing in *QST*, soliciting nominations for new director, and an election will be held at the same time as the regular winter elections in other divisions, resulting in the selection of a successor by middle December. Meanwhile, of course, Mr. Huber continues the Midwest Director.

Strays

W9CKG discovered an ad in his local newspaper which offered a short-wave converter with slug-in coils for sale! The papers are still manufacturing "Strays."

W7GP

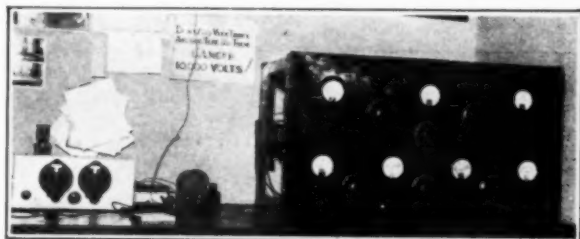
LIKE most amateur stations, W7GP is the result of gradual growth and modernization from a small beginning. The owner, Mr. Allan D. Gunston, of Olympia, Washington, began his radio activities back in 1912; on Thanksgiving Day to be exact, with typical low-power equipment for those days—a couple of spark coils with a straight gap hooked directly to the antenna. The receiving equipment was built around a galena detector and a telephone receiver snaffled from the house phone. During the intervening years the station has passed through the familiar transition from spark to c.w. and from low to high power, and the present station is modern in every respect.

One corner of the basement has been finished off with plaster-board for the radio shack. The room is ten feet square and has a 5' x 10' workroom off one end. A daybed, writing table, built-in operating table and a bookshelf are installed in the room in which the apparatus is located. All a.c. wiring is brought in through conduit to eliminate the possibility of induction hum in the receiver from the power wiring.

One of the photographs is a view of the operating table and shows the transmitter and receiver. The power-supply equipment is installed under the table.

plate, and functions as a 7180-kc. doubler. The third tube is a Type '03-A, and may be used as an amplifier on 7180 kc. or as a frequency doubler for 14,360 kc. feeding the '04-A on either of these frequencies.

The first three tubes and their tuning equipment are all carefully shielded from each other to prevent oscillation caused by stray feedback. The rear view photograph of the transmitter shows how these shields are constructed. There



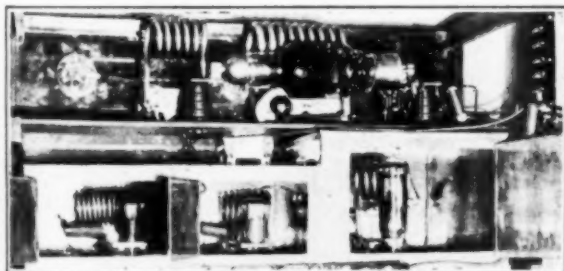
OPERATING TABLE AT W7GP

The station is located in a specially-built room in the basement of the house. Only the receiver and transmitter are visible in this photograph, the main power supply being located under the table. The monitor-frequency meter is on the table to the left of the receiver, but lack of room prevented its being included in the photograph.

is a door in each shield compartment to allow the operator to get at any part of the transmitter without difficulty. The shields are made from sheet copper. The '04-A stage and the antenna tuning equipment are mounted on a shelf above the other three tubes.

The rack which holds the transmitter is made of wood, and is 20 inches high, 36 inches long and 18 inches deep. All meters and variable condensers are mounted on the bakelite panel. The tuning condensers are all National double-spaced transmitting type, with the exception of the neutralizing condenser, which is a Cardwell which has been triple-spaced to prevent arcing. R.f. chokes are all home-made, and are wound on old 500-volt cartridge fuse cases. The inductances for the various stages are copper tubing of a size large enough to carry the tank currents of the different tubes without much heating. While tubing is not entirely necessary on the low-power stages for electrical reasons, it is used because of its rigidity.

Separate tank coils for the two bands are provided for both the '03-A and '04-A stages. To change from one band to the other is simply a matter of changing two coils and resetting the



REAR VIEW OF THE TRANSMITTER
Showing the shielding about the low-power stages.

THE TRANSMITTER

The transmitter is controlled by a 3590-kc. crystal, working up through successive amplifier and doubler stages to a Type '04-A final amplifier, and may be used on either 7180 or 14,360 kc. The diagram is shown in Fig. 1. The oscillator tube is a Type '10, supplied by plate power from 225 volts of "B" batteries. The next tube is also a Type '10, with 380 volts of "B" batteries on its

feeder tuning condensers and the tuning condensers on the last two stages. It can be done in a few minutes.

the operating room in the basement. The high-voltage plate supply for the '03-A and '04-A is a rectifier-filter system, a diagram of which is

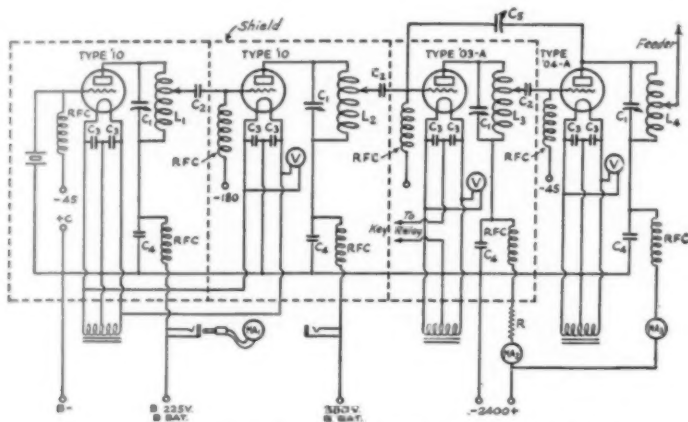


FIG. 1.—THE CRYSTAL-CONTROLLED TRANSMITTER

L_1 —13 turns of $\frac{1}{4}$ -inch copper tubing $2\frac{1}{2}$ inches in diameter.

L_2 —6 turns of $\frac{1}{4}$ -inch copper tubing $2\frac{1}{2}$ inches in diameter.

L_3 —6 turns $\frac{1}{4}$ inch copper tubing 3 inches in diameter for 7180 kc.
4 turns $\frac{3}{8}$ inch copper tubing 3 inches in diameter for 14,360 kc.

L_4 —6 turns of $\frac{1}{2}$ inch copper tubing 3 inches in diameter for 7180 kc.
4 turns of $\frac{1}{2}$ inch copper tubing 3 inches in diameter for 14,360 kc.

C_1 —National 450- μ fd. transmitting condenser.

C_2 —3000- μ fd. fixed condenser.

C_3 —2000- μ fd. fixed condenser.

C_4 —.02- μ fd. fixed condenser.

C_5 —Cardwell 21-plate receiving condenser cut down and triple-spaced.

RFC—250 turns of No. 34 silk-covered on 1-inch form.

MA_1 —0-150 milliammeter.

MA_2 —0-200 milliammeter.

MA_3 —0-500 milliammeter.

V —0-15 a.c. voltmeter.

T_1 —Plate transformer, 2400-volt secondary.

T_2 —Rectifier filament transformer with separate windings for each tube.

T_3 —7.5-volt transformer for Type '10 tubes.

T_4 —10-volt transformer for '03-A.

T_5 —12-volt transformer for '04-A.

R_1, R_2 —Relays.

R_3 —Time delay relay with two sets of contacts.

R_4 —Time delay relay, back connected.

CONSTANTS FOR RECEIVER IN FIG. 3, PAGE 47

L_1 —6 $\frac{1}{2}$ turns on Silver-Marshall form for 14,000 kc.
13 $\frac{1}{2}$ turns for 7000 kc.

25 $\frac{1}{2}$ turns for 3500 kc.
 L_2 —8 $\frac{1}{2}$ turns for 14,000 kc.
18 $\frac{1}{2}$ turns for 7000 kc.

33 turns for 3500 kc. (high-frequency end of band).
35 turns for 3500 kc. (low-frequency end of band).

L_3 —5 $\frac{1}{2}$ turns for 14,000 kc.
5 $\frac{1}{2}$ turns for 7000 kc.
9 $\frac{1}{2}$ turns for 3500 kc.

L_4 —Secondary winding of Ford spark coil.

C_1 —Midget condenser.

C_2 —Silver-Marshall No. 321 condenser, all rotary plates but one removed.

C_3 —Silver-Marshall No. 320-R variable condenser.

C_4 —500 μ fd.

C_5 —5000 μ fd.

C_6 —1- μ fd. by-pass condenser.

C_7 —.01 μ fd.

C_8 —6000 μ fd.

R_1 —5 ohms.

R_2 —10 ohms.

R_3 —5 megohms.

R_4 —200,000-ohm variable resistor.

R_5 —10 ohms.

R_6 —5 ohms.

R_7 —5 megohms.

R_8 —15-ohm rheostat.

RFC—Silver-Marshall short-wave choke.

R —Antenna relay.

POWER SUPPLY

The plate power for the two Type '10 tubes in the transmitter is furnished by a bank of storage "B" batteries which are located outside

shown in Fig. 2, and which is located under the table. The long leads shown in the photograph of the power supply are not left that way normally, but were made longer than necessary to

allow the transmitter to be turned around on the operating table for a rear-view photograph without disconnecting it from the power supply. The wires have since been straightened out and made ship-shape.

The high voltage is furnished by a 2-kw. line transformer supplying 2400 volts on the high-tension side. The rectifier consists of four Type '66 mercury-vapor tubes in a bridgeconnection. A 50-henry choke and a 5- μ fd. condenser form the filter. A drain resistor is connected across the output to keep the peak voltages on the filter condenser to a safe value. Radio-frequency chokes are mounted on the filter condenser terminals to prevent stray r.f. from getting into the condenser and causing breakdown.

Each of the tubes in the transmitter has its individual filament transformer, with the exception of the Type '10's, which have a common filament supply. The rectifier tubes are all furnished with filament power from the same transformer, but a separate filament winding is provided for each tube. All the filament transformers were constructed at home.

Fig. 2 also shows the keying system, which is

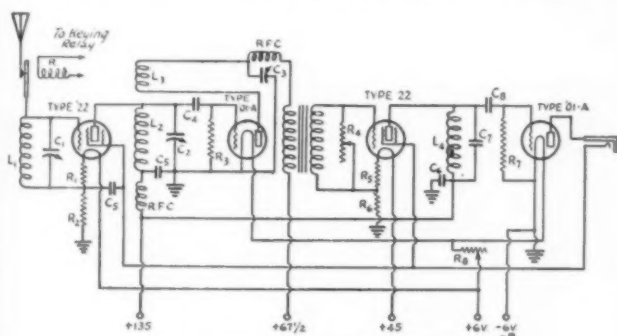


FIG. 3. — THE FOUR-TUBE RECEIVER
(For constants see second col., Fig. 1.)

designed to be semi-automatic and prevent damage to the rectifier tubes by applying plate voltage to them too quickly after the filaments are lighted. It is similar to the system described in QST for July, 1929.¹ R_3 and R_4 are time-delay relays, and are adjusted so that the armatures are released about two seconds after the current to the magnets is shut off. When the switch S is closed Relays 1 and 2 are energized, closing their

¹Time Relay Control of Transmitters, QST, July, 1929.

respective contacts. R_1 closes the primary of the rectifier filament transformer, lighting the filaments of the rectifier tubes. R_2 at the same time closes, making it possible for R_4 to control the power for the rectifier plates. When the key is

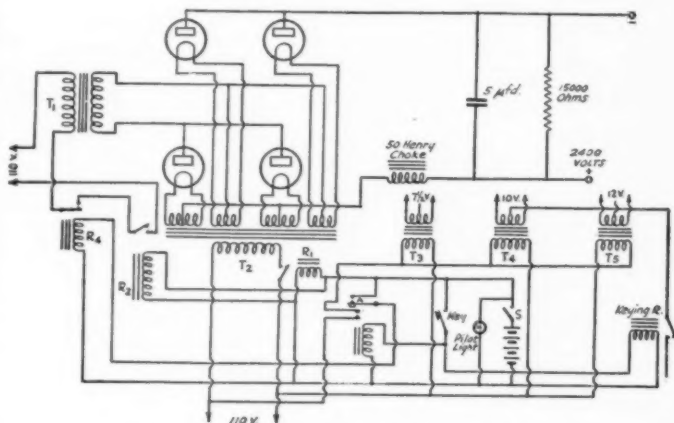


FIG. 2. — POWER SUPPLY AND KEYING SYSTEM
The rectifier consists of four Type '66 tubes connected in the usual bridge arrangement.

open the contacts at "A" on R_3 are closed, thus completing the circuit through R_4 when S is closed, and opening the 110-volt line to the plate transformer, since the contacts of R_4 are open when its magnet is energized. When the key is pressed the keying relay operates in normal fashion, and at the same time contacts "A" on R_3 open, releasing R_4 and thus closing the line to the plate transformer after a two-second interval. The lower contacts on R_3 also close, completing the 110-volt circuit to the filament transformers for the transmitting tubes.

If the key is released for more than two seconds the armature of R_3 is released, closing the contacts at "A," which in turn energizes R_4 and opens the primary of the plate transformer. The filament voltage on the transmitting tubes is also removed when the lower contacts on R_3 open. R_2 is in the circuit simply for protective purposes, since it prevents the application of plate voltage to the rectifier tubes when the filaments are not lighted.

The filament center-tap lead of the '03-A stage is broken for keying.

RECEIVER

The receiver is a manufactured outfit which has been remodelled to permit easy tuning in the

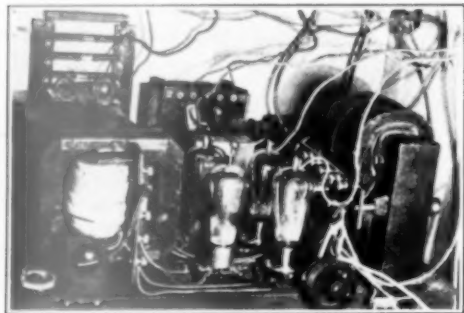
amateur bands. The diagram is shown in Fig. 3. It is an adaptation of the four-tube receiver described in *QST* for November, 1928, using throttle-condenser control of regeneration and tuned r.f. amplification. A midget condenser tunes the r.f. stage, and is controlled by the knob on the lower left-hand corner of the panel. The r.f. coil is mounted on the left side of the aluminum cabinet, and the detector coil on top. The peaked audio stage uses a Type '22 tube, with a Ford spark-coil secondary tuned by a fixed condenser to obtain a peak at about 1000 cycles.

In rebuilding the receiver, pigtales were added to the condensers to eliminate noises from poor bearing contacts, and plates were removed from the detector tuning condenser until the bands were spread satisfactorily. This also necessitated re-winding the coils, but was well worth the trouble, since the 7000-ke. band now covers 90 divisions on the tuning dial and the 14,000-ke. band 40 divisions, making tuning easy.

The relay in the antenna circuit disconnects the antenna when the key is pressed, allowing break-in operation without blocking the receiving tubes.

MONITOR AND FREQUENCY METER

The combined monitor and frequency meter, a diagram of which is shown in Fig. 4, does not appear in the photograph of the station, but is located on the operating table to the left of the receiver. The oscillator uses a Type '99 tube in the usual tickler circuit, with a calibrated ab-



THE 2400-VOLT POWER SUPPLY

The filament transformers for the transmitter and rectifier tubes are also shown in this photo. As explained in the text, the leads have been straightened out and cabled since the photograph was taken.

sorption meter which is coupled to the oscillator through a fixed condenser in the system described in *QST* for October, 1928. Both monitor and frequency meter are thoroughly shielded, and since the coupling between the two is fixed the meter can be calibrated much more accurately than is possible with the usual absorption meter.

ANTENNA SYSTEM

The transmitting antenna is a Hertz with a single-wire feeder, constructed for operation on

7180 ke. The second harmonic is used for 14,360 ke. The wire is No. 12 enamelled, and Pyrex insulators are used.

A separate outside antenna, running at right angles to the transmitting antenna, is used for receiving.

OPERATION

An accurate log is kept of all stations worked and the conditions obtaining at the time, so that the operator has a constant check on the performance of the station. Two objects were kept in

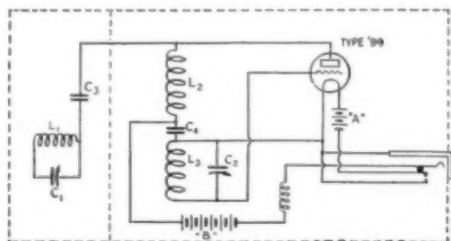


FIG. 4. — THE MONITOR-FREQUENCY METER

L₁ — 16 turns of No. 24 d.c.c. on tube base.

L₂ — 13 turns of No. 24 d.c.c. on tube base.

L₃ — 12 turns of No. 24 d.c.c. on tube base.

C₁ — Variable-range condenser (National).

C₂ — Double-spaced midget condenser.

C₃ — Small coupling condenser.

C₄ — 1000 µfd.

RFC — Receiver-type r.f. choke.

mind in building up the apparatus; first, maximum performance according to the best amateur practice and second, simplicity of operation. Visiting amateurs can operate the station with ease whether the owner is there or not.

Twelve countries in four different continents have been worked.

Strays

Every now and then (but fortunately infrequently) it becomes our unpleasant duty to report the death of some fellow-amateur who has been electrocuted while erecting an antenna near a high-tension line because proper precautions were not taken to insulate the antenna or guy wires. The case of William Gaffery, W6DTS, was much worse than most because his mother and cousin, who were helping put up a new mast near an 11,000-volt transmission line, were instantly killed when one of the uninsulated guy wires touched the line. Gaffery rushed to the assistance of his mother and was fatally burned. His two sisters, who were also helping, received severe burns as well.

For heaven's sake, gang, use a little ordinary care in putting up antennas or masts near high-voltage wires, or better yet, don't erect antennas near them.

I. A. R. U. NEWS

Devoted to the interests and activities of the

INTERNATIONAL AMATEUR RADIO UNION

President: H. P. MAXIM

Vice-President: C. H. STEWART

Secretary: K. B. WARNER

Headquarters Society:

THE AMERICAN RADIO RELAY LEAGUE, Hartford, Conn.

MEMBER SOCIETIES

American Radio Relay League

Asociacion E. A. R.

Associazione Radiotecnica Italiana

Canadian Section, A.R.R.L.

Deutscher Amateur-Sende-und Empfangsdienst

Experimenterende Danske Radioamatører

Lwowski Klub Krotkofalowcow

Nederlandsche Vereeniging voor Internationaal Radio-amateurisme

New Zealand Association of Radio Transmitters

Norwegian Radio Relay League

Radio Society of Great Britain

Reseau Belge

Reseau Emetteurs Français

South African Radio Relay League

Sveriges Sandareamatörer

Union Schweiz Kurzwellen Amateure

Wireless Institute of Australia

Wireless Society of Ireland

Conducted by Clinton B. DeSoto

AS a result of 10 affirmative votes received from member-societies of the Union in response to Proposal No. 3 in Calendar No. 3, dated December 31, 1929, it is with pleasure that Union Headquarters announces the admission of the following additional societies as full-fledged members of the I.A.R.U. effective August 15th:

Lwowski Klub Krotkofalowcow (L.K.K.), Bielowskiego 6, Lwow, Poland.

Sveriges Sandareamatörer (S.S.A.), Stockholm 8, Sweden.

Union Schweiz Kurzwellen Amateure (U.S.K.A.), Postfach, Zurich 22, Switzerland.

Wireless Society of Ireland (W.S.I.), 12 Trinity Street, Dublin, Ireland.

The present members of the Union join in welcoming the new organizations, which are well known as active, energetic, and representative of the flourishing amateur interest in their respective countries. The addition of their forces marks a distinct advance in the strength of international amateur radio.

Union Headquarters wishes to state that it will be pleased to consider applications for membership from *bona-fide* national amateur organizations, in other countries, who are truly representative and inclusive in their scope, and whose membership in the Union would benefit both themselves and amateur radio as a whole. Applications for membership should be sent to the I.A.R.U. Secretary at Hartford, Conn., U. S. A.

In reference to the new members, it is pointed out that reports from all but the last have appeared in this and the September issue of *QST*. We have received reports to the effect that an amalgamation between the L.K.K. and the Polski Klub Radjo Nadawców, a regional Polish amateur organization, is contemplated to take effect soon, possibly incurring a change of name.

Union Headquarters has received several letters from the secretary of the International Amateur Radio Association of China, containing a great deal of interesting information on the Association and Chinese amateur conditions.

The active members of this Association are those who reside and operate in the city of Shanghai, while those residing in other places are accepted as associate members without the powers and privileges of membership. Our good wishes for the future of the I.A.R.A.C.

A somewhat similar organization was organized on May 3d in Hongkong, the Hongkong Amateur Radio Transmitting Society. The official organ, *D.X.*, is an interesting publication of surprising size and scope for such a new venture. The first issue contains several good technical articles, interesting local news, and well-chosen features and special items.

Union Headquarters extends its congratulations to the H.A.R.T.S. and its new publication.

George W. Mesher, W6ERK, of 2949 Sacramento Street, San Francisco, Calif., advises that he will forward QSL cards to any place on the globe. He has a chain of stations in operation under his supervision to do this work, and will be glad to reply to all requests for calls and new calls.

The *Reseau des Emetteurs Français* (R.E.F.) held its second annual convention at the municipal building of the sixth district in Paris on the 30th and 31st of May under the chairmanship of Mr. J. Levebvre, president and founder of the league.

A series of resolutions were drawn up and passed upon for presentation to the Minister of Posts, Telegraphs, and Telephones. They included requests for conformity of the French amateur

French amateurs be accorded representation and official recognition at all meetings and conferences called for the discussion of matters affecting them, particularly those bearing on the next international conference at Madrid in 1932.

AUSTRALIAN REPORT

By W. G. Sones, Dir. Fed. Publicity, W.I.A.

In common with all other sections, Australian amateurs have much to find fault with in prevailing atmospheric conditions as reported in overseas magazines. Both the 7- and 14-mc. bands are particularly subject to interference at the present moment, when for this season in Australia just the reverse should be true. The reason is hard to account for, but is evidently due to the prevalence of sun spots. When conditions are good "W's" come through well from about 0530 to 1100 G.C.T. "G's" and "F's" and other European stations can be worked much later, up till 1700 or 1800 G.C.T.

For local work the 7- and 3.5-mc. bands are the most used, and the 14-mc. band is silent of either local or overseas stations. Australian amateurs are plugging away at 28 mc. with fair success, and much interesting data is being accumulated. Among the members of the section working in that band, interest is being shown in the high frequency tests from American stations. The reports so far have been slow in coming in, but if any are made they will be reported in due course.

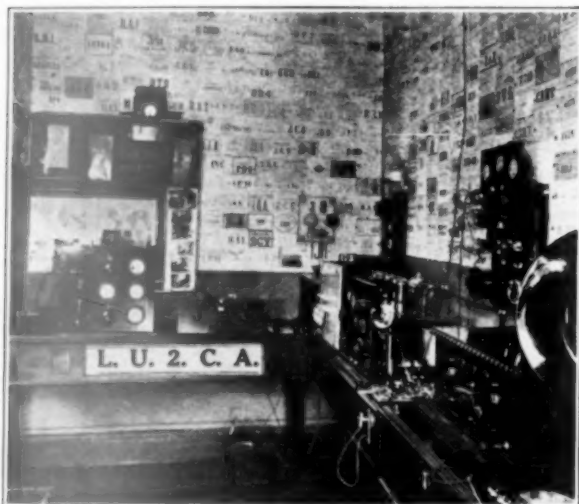
All divisions of the Wireless Institute of Australia report increasing membership and continued enthusiasm. While no figures are available for the total membership of the Commonwealth, it must be in the region of 400 to 500 out of a total number of 600 licensed stations, active and inactive.

Quite a lot of phone work is being undertaken by local men on the 7-, 3.5- and 1.8-mc. bands. No restrictions

are placed on Australian experimenters in regard to the broadcasting of gramophone records other than in the protection of copyrights, etc., so that amateur stations are rather popular with the B.C.L.'s for their programs. Phone transmission of course does not consist entirely of broadcast records, but they provide a useful method of modulating while testing without the continual necessity of constantly speaking into the microphone, and a relief from the limited amount of rag-chewing which is permitted under the regulations. As a matter of fact, a good deal of the broadcast telephony is really excellent, especially on the lower frequency bands.

It will be remembered that Australian experi-

(Continued on page 64)



LU2CA, ANGEL RADAELLI, PARAGUAY 2233, BUENOS AIRES, HAS WORKED 61 COUNTRIES IN ALL CONTINENTS

Three transmitters, two of 30 and one of 300 watts power, are used on 7 and 14 mc. The two receivers employ the Schnell and Hartley circuits respectively.

regulations with the provisions of the Washington conference; revision of the system of taxation of transmitters as distinguished from receiving stations; automatic yearly renewal of licenses until voluntarily discontinued, with an interval of two years after expiration without renewal before the call letters are re-issued; and that amateur activity in all countries be brought periodically before the Berne Bureau by the respective governments. Requests are made for close surveillance of commercial and broadcast stations to prevent their interference with or unauthorized occupation of amateur territory. The final request is for a special rate for the handling of QSL cards by the postal service.

We note with pleasure that it is requested that

Calls Heard



W. Clyde Townsend, Radio Operator S.S. "Ripley Castle," 76 Wilton Ave., Southampton, England

4000 TO 3000 MILES, NORTH CAPETOWN

7000-ke. band

w1aal w1agk w1awe w1bdt w2apd w2atz w2bff w2bro w2bet w2ber w2bsw w2jo w2wy w3ahp w3ahw w3ajd w3apf w2awb w3djw w3ec w3hg w3ld w3mo w3rj w4ahj w4ald w4alg w4ec w4he w4jm w4oa w5aar w5ah w5hn w5nw w5ol w5 w5uf w5ak w5adu w5bck w5bcs w5cri w5dg w5dik w5dyg w5gz w5mb w5ro w5ain w5arf w5bas w5bhf w5bpb w5crn w5daz w5ell cm2jm ear85 ear98 ef8axi f8ee f8pn frear1 frear149 frear153 nn1nic pa0xh ve2ac ve2am

3000 TO 2000 MILES, NORTH CAPETOWN

7000-ke. band

w1bbz w1bdt w1bnn w1bif w1bvr w1bss w1fc w1vp w2ays w2bai w2bch w2bex w2bda w2bdf w2bkn w2bmm w2bws w2jr w2ma w2op w2in w2rp w2uk w3all w3anh w3apf w2awm f3dc w3dh w3on w4af w4ahl w4afw w3rm w4we w4ya w5aea w5aad w5bat w5bbv w5nw w5uf w5zk w8aav w8bg w8cn w8dc w8dl w8jh w8ke w8ltw w8rs w9bz w9gf ct1aa ct2ac ear98 ear110 f8pbo f8whg fm8fva frear149 ill k4cf

14,000-ke. band

w1awe w1dp w2atx w2rs w8cam w8dik pylaa pylah ve2aa

2000 TO 1000 MILES, NORTH CAPETOWN

7000-ke. band

w1agk w1ala w1ejd w1im w1pk w1si w2abe w2bda w2bir w2cxl w2wr w4adi w4ae w3aft w3anh w4ft w5bbu w8chd ear98 frear13 ve2bd ve2ca.

14,000-ke. band

w1afa w1agi w1ae w1bil w1da w1mo w2arb w2ave w2bai w2bih w2cvf w2el w2jn w2mb w2rs w2rd w3bph w4fi w4pk 35bbh w7fh w8chn w8cir w8dbk w9avp w9cir widlu wifin wifaj ct1bx d4xn f8daf g6vp g6wt lu3de lu8dy on4hc pylaa pylah pylia ve2ac ve2hg vo8aw vi4nev z4a z4im z56p at2p zu6w

1000 MILES, NORTH CAPETOWN TO CAPETOWN

7000-ke. band

w1agk w1bvr w1lu w2cxl w2wr w3aob w3ec w4ir w5ayl w8chg w9bxk w9dzm

14,000-ke. band

w1ait w1beb w1bwa w1cow w1ctb w1dp w1mo w2adp w2aly w2ave w2bai w2bih w2bir w2bok w2cr w2el w2giy w2hi w2ib w2jn w2vd w3aiv w3arp w3bd w3hg w3pe w4aul w6dmk w6eem w6ejc w6eug w7wl w8aau w8awf w8bit w8bud w8cro w8chd w8djs w8djv w8dlld w8fs w8za w9azz w9brx w9byc w9enr w9gfo w9giu ct1bx fo2sra fo3ar fo4sr pylaa pylcm pt2bf py2ib py3ah lu3dh ve2al ve2bd vo8aw t5l

F8HA Jacques de MauSSION, Coulommiers S.-d.-M. France

w1bft w1cmx w1dq w1bux w1om w1awp w1fs w1og w1cqr w1qy w1cox w1mo w1ccx w1qb w2dh w2rs w2vd w2bpd w2ag w2amr w2bn w2ns w2arn w2aix w2bjg w2bka w2ahp w2biv w2acz w2wf w2akk w2avq w2ai w2cuq w2aot w2ano w2bis w2qf w2hg w2cd2 w2tt w2ac w2cfm w2bwc w2jn w3dh w3pf w3cee w3mm w3ads w3ajh w3amu w3aiz w4mm w4ahl w4gy w4et w4akh w8bnu w8afm w8ud w8aq w8drc w8ft w9aja vk2rx luldc lulex lu2ca lu3de lu3pa lu8dy ludw k4akv k4kd pylaa pylas pylax pylaw pylcl pylcm

pylah pylbf py2bf pylbg pylak celah celal ce2ch ce3cr ce7aa velar velbd ve2bb ve3cr ve7aa velar velbd ve2bb ve3xc cr4ad oa4ja cx1om hclfg frear149 va8ab va7ad va7ap vo8aw vo8me f28hpg cm8uf cm2jm yslx n8nrc n8emi

G6LK, E. Laker, Alfold Road, Cranleigh, Guilford, Surrey, England

7000- and 14,000-ke. bands

w1ae w1aep w1asf w1cmx w1cow w1kh w1qb w1og w2bax w2bai w2bdh w2amr w2bnx w2anu w2cxl w2jn w2ep w2ip w2ai w2qn w2vt w3bph w2dhw w3la w4adp w4ajk w4ft w4mk w4nb w5aso w5bck w5bdt w5bqd w5dji w5dlld w9aja w9bvh w9dee w9dft w9dku w9enr w9aep ve2as ve2bd ve2be ve2ca ve3bk ve3bm ve3za ve3ad ve5ad ve5awn vo8mc vq4cre ve4lma v7ap v8ab vk2cd vk2hc vk2jp vk2rx vk3dx vk3ab vk3bw vk3lp vk4bb vk5ja z12gh z13as z13em zslp zsm sp2ab k4akv nj2pa nn1nic h1lah kfu5 kfr6 k4dk k4kf pylah pylaw pylbr pyld pyld pyld pyler py2ay py2bf py2bg py2ik py3ay lula ly2dj lu2fi lu2de lu3dh lu3fa lu3hc lu4d2 lu8dy lu9dt cx1af cx1ac cx1fb cx1oa cx2b5 oa4q oa4j ce2ab ce3ab ce3bf ce3ch ce4cr ce5aa cp1aa hclfg f8ghp

W1AAM, W. C. Spicer, Jr., Groton, Conn.

cm2jt cm2sh cm2xd cm8uf ct1cc ct1cw d4go ear16 ear113 f8gv g2bm g6wt g6xb lu5ac nj2pa n8mrc n8emi oa4j oa4z on4dj on4fp pylah pylaw pylia ra4j ve4ho ve4bu ve4gr

Al. Laasanen, 36 A St., Gardner, Mass.

3500- to 3550-ke. phone band

w9aeq w9aum w9bag w9bfb w9bjw w9bwi w9bwp w9bxo w9bza w9cfl w9cmz w9dpg w9dxo w9eem w9elx w9eme w9eng w9eqx w9eux w9ewx w9fel w9fmd w9ful w9gdb w9ghx w9mm w7acj w7ant w7ce w6abf w6bar w6bik w6bql w6bru w6bv w6ne w6crk w6ean w5kx w4fi w4hn w4ia w4oo velak veldq ve3bb

14,100-ke. phone

w8bid w8rd w5ql w4ew xn5 w8ema

PMZ, All-American Lyric Malaysian Expedition

7000-ke. band

w6aaz w6ac w6adj w6ad w6ags w6ahp w6akt w6akw w6alv w6am w6amm w6amn w6amw w6anal w6apd w6arv w6asl w6auk w6avp w6awd w6awp w6axe w6aye w6ben w6bcu w6bfu w6bip w6bjd w6blu w6bmt w6bpm w6bqa w6bra w6bts w6bux w6bxi w6by w6bry w6cas w6cgm w6cih w6cis w6cqc w6cuh w6cui w6cut w6cww w6cxv w6cyi w6dea w6dcq w6dev w6dng w6dob w6dog w6dqv w6drr w6dtd w6dtw w6dvq w6dwi w6dzw w6dry w6egb w6ebn w6ed w6eea w6egh w6ehf w6ehg w6ehi w6eib w6eke w6ekw w6elc w6elm w6eot w6epz w6egf w6esw w6euh w6eva w6hm w6jn w6ju w6ry w6sc w6tm w6xb w7abh w7ac w7afo w7alm w7aq w7bb w7mo w7nr w7qf w7ua w7wr w9bez w9bqw w9doc w9ss w5ahq w5amr w5bbe w5bby w5zm

W1BFT, C. B. Evans, Durham, N. H.

ce2ab ce3ca ce3ch ce3cr ce5aa cm2jm cm2jt cm2sh cm8uf cm8tb cm8yh cm8ux ce1fm ct1aa ct1ae ct1bx ct1ay ct2aa ct5ad cr4ad cx1oa cx1af cx2ak d4xn ear10 ear36 ear37 ear39 ear65 ear98 ear116 ear125 ear136 ear149 ear196 f8aap f8aw f8aly f8axq f8azo f8bx f8ces f8cs f8da f8dmf f8dr f8ex f8faf f8fg f8fk f8fo f8fq f8gdb f8gi f8fem f8ha f8hr f8j f8kz f8lgb

(Continued on page 86)

Correspondence

The Publishers of QST assume no responsibility for statements made herein by correspondents.



S. F.

2504 Crane Avenue,
Detroit, Mich.

Messrs: Howard Chinn, Paul Hendricks and Round Hill Gang:

This is just a word of appreciation for your standard frequency transmissions, the first of which I received on the afternoon of July 18th.

I own only an S.W. receiver and have puttered around with it for some little time now, but I soon gleaned the fact that even for receiving alone a fellow has to have some sort of frequency meter to know where he is located in the various kc.'s. So I put together one of the meters so well described in the *Handbook* and tuned in on your W1AXV signals on above mentioned date. Imagine my surprise and feeling of gratitude for the work you fellows are doing when I, a perfect dub, not even able to read the code, found myself able to make out your call and frequency designations with ease and to calibrate my own meter's 7000- to 7300-kc. band and its harmonics! Your signals came in moderately loud, no fading, and very readable due to your elegant d.c. note and skill in transmitting — as contrasted with some of the other peculiar mutterings still to be heard on the amateur bands, and off of them, but still emanating from amateurs nevertheless. F.B. I will keep on listening to these S.F.T.'s of yours until your shack caves in.

A million thanks OM's and again as many hopes that you will continue your work for both those that know and appreciate the effort you are exerting — and those that don't but who may, after they feel the prod of the radio inspector.

— Norman C. Grewe

A Comment on "Marine Operating"

822 Broadway,
McKees Rocks, Penn.

Editor, QST:

Having read the letter written by Mervyn Rathbone, Jr., I could not help making a few comments on marine radio operating myself.

To begin with, like the advertising that Mr. Rathbone speaks of, some of the statements he made are somewhat misleading.

He states that the steamship lines allow from 40 cents to one dollar a day for meals. I personally was never on any ship that allotted more than

fifty-three cents per day and, though I did not receive "turkey with the trimmin's," I did, on every boat I was on, receive "chicken with all the trimmin's" and every Sunday at that, which I think is more than the average person has on land. Of course there are some "starvation lines," but an operator does not have to take out any old tub.

The same applies to the living quarters on the boats. I was on a tanker when I left the sea, and the quarters I had were as large and well-equipped as the average small hotel room. Of course the walls were painted white instead of being papered and there was no rug on the floor, but it was furnished with a bunk with four drawers under it, a settee, chair, sink with hot and cold running water, a large clothes press and a cabinet for shaving material, etc.

As to the engineers and officers, some of them are uneducated, but then I know a lot of radio operators who do not have such excellent table manners. Mr. Rathbone seems to forget that engineers have to take just as stiff an examination as any radio operators ever had to, and at present where a radio operator takes two exams to obtain a first class ticket, an engineer is required to take four before he obtains a chief's ticket. In my own seagoing experience, I never was treated as anything but the equal of any of the other officers of the ship.

I am at present operating broadcasting station WJAS and also instruct code in a radio school, but intend to go back to sea again just as soon as I get the — urge which I don't doubt will be very soon, as I know I still can get a thrill out of visiting Hamburg, Antwerp, Rouen and Paris.

— George J. Shannon, ex-W8BJT, ex-KJEL

A Commercial Op Speaks

S. S. Atlas,
Providence, R. I.

Editor, QST:

The August, 1930, issue of QST has a few items in it which have tempted me to write.

I have received so much enjoyment and knowledge from articles in all issues of QST — technical or non-technical — that I would not like to see you change from the style in which you have been writing them.

I am rather below the average in higher mathematics, having forgotten what I did learn at high school, but even so can generally get information out of the "too technical" articles by

1930

I not
d, on
ll the
ich I
as on
nes,"
y old

n the
, and
ipped
e the
pered
t was
der it,
nning
et for

them
radio
table
that
nation
resent
obtain
o take
y own
s any-
ers of

tation
chool,
pon as
e very
visit-

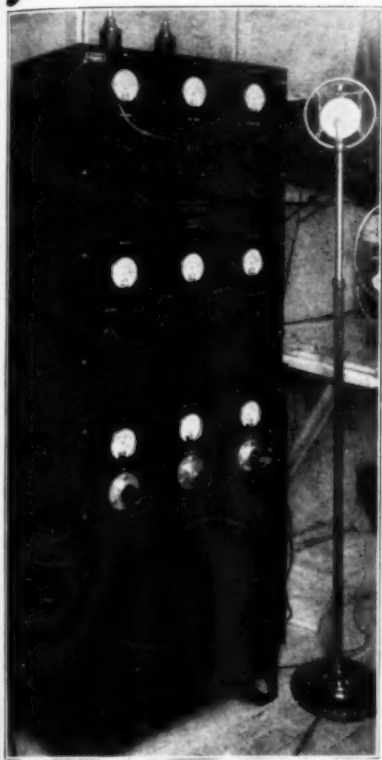
KJEL
S
Atlas,
R. I.

items

t and
ST—
ld not
which

higher
learn
get in-
cles by

JEWELL METERS



at the 1930
Air Races



THE control transmitter of the radio network at the 1930 National Air Races used nine Jewell Meters to watch circuits continuously wherever it was desirable to check voltage or current.

This transmitter, especially built for the occasion, used two 50 watt tubes in parallel for the power amplifier stage inductively coupled to an antenna counterpoise system. They were preceded by an 865 shield grid tube master oscillator, controlled by a 210 tube in a crystal oscillator circuit.

During the day this transmitter maintained communications between the radio room located near the judges' tower, the three pylons, and the judges' car. At night it was used to maintain amateur broadcasting programs.

Jewell Instruments have long been the favorites of radio amateurs and experimenters. Mail the coupon for descriptive bulletin.

30 YEARS MAKING GOOD INSTRUMENTS
JEWELL
Radio
Instruments

Jewell Electrical Instrument Co.
1642-C Walnut St., Chicago, Illinois
Please mail bulletin describing Jewell Instruments for amateur operators and experimenters.

Name

Address

POPULAR!

—new, improved

TRIAD

RADIO TUBES

EVERY development known to radio tube science — you will find them *all* built into the new, improved TRIAD line. Types T-24 and T-45 have been entirely redesigned to assure greater power output and less distortion at higher signal voltages. The new construction and thoriated tungsten filament makes T-210 an easy oscillator and guarantees a longer life. The construction of T-50 has been strengthened to withstand the most severe usage.

All through the entire TRIAD line you will find the same sensational improvements carried out. No wonder TRIAD tubes have won the confidence of the tube-buying public!



We have designed a 210 tube for strenuous service under transmitting conditions. The filament is thoriated tungsten and the plates are molybdenum. At exhaust, each 210 is individually treated and evacuated for the highest possible vacuum.

For further information send for our bulletin T-10. Special prices extended to Licensed Amateurs and Members of A.R.R.L.

TRIAD Tubes are fully licensed under all R.C.A. General Electric and Westinghouse Electric Mfg. Co. Patents.

Triad Manufacturing Co.
Pawtucket, R. I.

reading them three or four times. In fact, I get my greatest kick by going back and recalling different technical articles I have read in *QST* — which, by the way, did not have any algebra or calculus in them.

I am a radio operator, in fact have put in so much time that I think I am in the old-timer class now. I started in 1912. 1913 saw me with a ham set; 1914 a railroad telegrapher; 1917, assigned to signal section, Balloon Corps; since 1920 at sea most of the time, but managed to have an amateur station from 1921 to 1926. The last four years I have been steady at sea.

Which brings me to the letter on "Marine Radio Operating" on page 66 of the August issue.

I have read articles in *QST* by marine radio operators before which were interesting and this one is so true, so out-rightly true, that I would think *QST* might need to retire to the "bomb-proof dugouts" which you use when you write those "too-technical articles." The radio schools and others might see in this letter a bad blow to their interests — however, I would like to back Rathbone's letter as it is — for it could not be made any plainer, nor more truthful. The only way one could really understand it is to have had an operator's life at sea.

Then I would like to add that although all he has said will be verified by thousands of us in marine operating, where can anyone go in any occupation and not find conditions which are just as bad as those encountered at sea? There are thousands working in different occupations on land under circumstances which are just as difficult and obnoxious to them as conditions are to us at sea. Some wish they just had an opportunity to go to sea, and who can hold back the young hopeful who has been tinkering with radio since his grammar-school days and at last secures his operator's license — without even going to radio school — and then takes out his first ship? It may be quite a disappointment — but he will get over it.

I think from my experience that these occupational difficulties can never be cleared up to our satisfaction, even in a life time. It would be great if all those at sea could trade places with all those wanting to go to sea — so each one could get the experiences of the other and be somewhat more satisfied — but that, of course, is an impossibility. Those with experience in work on both land and sea know that there are certain advantages in both.

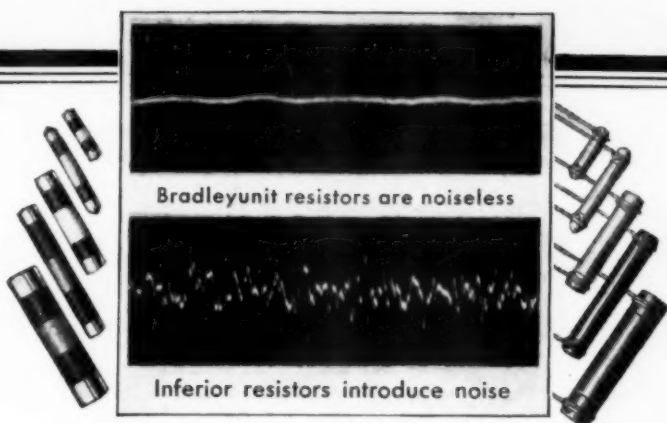
— G. W. Stewart

"Too Technical"

Middlesboro, Ky.

Editor, *QST*:

Well, well, well and well! Congratulations on your editorial in the August issue. What is a "ham" anyway? Is he a guy who doesn't know anything, can't think for himself, etc., or is he a real radio man? Not necessarily an engineer — but at least a man who believes in experimentation and one who is willing to work out problems



Bradleyunit Resistors are different ◀◀ they're Noiseless ▶▶

MODERN radio receivers utilize many fixed resistors. If these resistors are of poor quality they introduce unnecessary and disturbing noises in the receiver. Comparative oscillograms of current variation in receiver circuits are shown above. The upper oscillogram portrays the silent operation of a receiver equipped with Bradleyunits. The

lower oscillogram portrays the irritating noises introduced in a receiver circuit by poor resistors.

Bradleyunits are solid-molded resistors that are unaffected by moisture, temperature or age. They are noiseless! Millions of these units are used annually by the leading radio manufacturers.

Bradleyometer the Perfect Potentiometer

A new step potentiometer of approximately 50 steps. Each step is separately controlled and any resistance-rotation curve can be obtained.



The resistor comprises a series of resistance discs interleaved between thin metal discs. A moving arm makes contact with the resistor.

Two or more Bradleyometers may be assembled in tandem, for volume control, mixer control, T-Pad and H-Pad attenuators and for every type of radio circuit.



Bradley Suppressors for Radio Equipped Cars

Prominent motor car manufacturers are providing their radio-equipped cars with Bradley Suppressors. Individual Bradley Suppressors for each spark plug and for the common distributor lead minimize the disturbing oscillations in the circuit and thus suppress interference in the receiver from ignition systems. When used with by-pass condensers in other parts of the ignition circuit, shielded ignition cables are not required. The power of the engine is not affected by Bradley Suppressors.

Allen-Bradley Co.
277 Greenfield Ave., Milwaukee, Wis.



ALLEN-BRADLEY RESISTORS

Produced by the makers of Allen-Bradley Control Apparatus

Learn Radio Telegraphy

THIS new library contains the essential information for the student who wishes to learn radio telegraphy. The books are especially written for home study work. Not only are all of the essential facts concerning radio telegraphy given, but the leading questions and their answers which are used for government examinations are also covered.

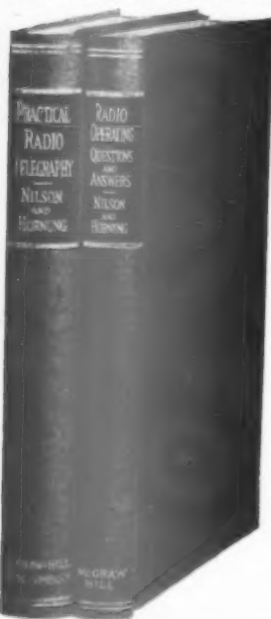
Library of Practical Radio Telegraphy

647 pages, 5½ x 8, 314 illustrations

By ARTHUR R. NILSON, Lieutenant (Technician) (Communications) U.S.N.R.; Member I.R.E.; Member Radio Club of America
and J. L. HORNING, Fellow Radio Club of America; Associate Member I.R.E.

The Library consists of two volumes:

VOLUME I — Practical Radio Telegraphy, covers the theory and practical operation of every type of modern commercial arc, spark, and vacuum tube transmitter; furnishes complete data on all kinds of up-to-date vacuum receivers. The book is arranged so that each chapter is devoted to a definite assignment of work — this enables the home-study reader to lay out a course in the theory of radio telegraphy which is easy to follow and grasp.



VOLUME II — Radio Operating Questions and Answers. Second Edition. This new revised second edition of Radio Questions and Answers covers the great advances which have been made since 1921 in the art of radio communication; it takes into account the new technique of broadcast-station operation which has been evolved through electrical, mechanical and physical improvements. Questions, with their answers, on the leading problems of radio operation have been carefully worked out, for the assistance of the student who is preparing for his operator's license.

SPECIAL OFFER

Examine and use this library for ten days Free. At the end of this time, if the library proves satisfactory, send us only one dollar and two dollars a month until the special introductory price of five dollars has been paid. If the library is not satisfactory return it to us in ten days. The matter ends there. No agents. No red tape.

**Send no money
Fill in and mail the
coupon today!**

McGraw-Hill FREE Examination Coupon

McGRAW-HILL BOOK CO., INC.
370 Seventh Avenue, New York

Gentlemen: — Send me the New Library of Practical Radio Telegraphy, all charges prepaid, for 10 days' Free Examination. If satisfactory I will send \$1.00 in ten days and \$2.00 a month until \$5.00 has been paid. If not wanted I will return at your expense.

Name.....
Home Address.....
City and State.....
Name of Company.....
Occupation.....

QST-10-30

for himself. Let us hope that every A.R.R.L. man is in the latter class — and may QST have more "tech!"

73, etc.

— M. O. Sharpe

Things in General

Cleveland, Ohio

Editor, QST:

The current QST arrived yesterday. As usual, I sat down and read the book through, cover to cover, specially noting the editorial and the detector tube article. The PMZ story is the kind we should like more of, but I was told sometime ago by K.B.W. not to expect many such, due to the fact that good operators and good story writers rarely are included in one man. Hi! The dummy antenna problem is a good one; all in all it was a very good issue.

Leaving the house I was joined by a beginner, a man in years, a pre-war ham and now holder of a temporary. "Seen the Quist?," I asked him.

"Yep, outside of the dummy antenna there's not a darn thing in it," he replied. And then I blew up. No, he hadn't read the Editorial Page. The contest held no interest for him, the technical articles dealt in phrases above "2 turns on a 2-inch coil," hence over his head. You men have the correct attitude. Make the gang come up to a level on a par with what a 1930 amateur should be. I am rusty on math, physics and such, but believe me I read 'em all — part of it will soak in.

Then we tried to calibrate a frequency meter from W1AXV's signals. The 7000-ke. signal was fine — 7100 was jammed so bad that it was a very hard task to hear W1AXV. Some dum' phool was on top of them, adjusting his transmitter to their wave. Sometime ago you published a word or so about such practice. I want to add my bit. Such idiocy should be a crime. I know you men try. But why in the name of old Betsy can't the lids learn to behave like gentlemen. This is a man's game, a gentleman's game, if you please.

No, the slowdown cuss didn't sign. He wouldn't, but I hope he reads this letter.

Night after night I hear held-down keys, hash on the air, meaningless signals. There is a law that says, "no superfluous signals —" also another law that says, "no malicious interference —" I believe there are more lids on the air to-day than ever, in proportion to the number of good amateurs. One hears many stations operated and built properly, but too many are the other kind — sloppily built and rottenly operated. Why can't a drive be made by the operators who are playing the game against the "lids" that crowd and wobble on the 7000-ke. band? Boycott them — answer no long CQ's — drop a man who sends hash — give him an "SK" and leave him calling the wind. What say, gang?

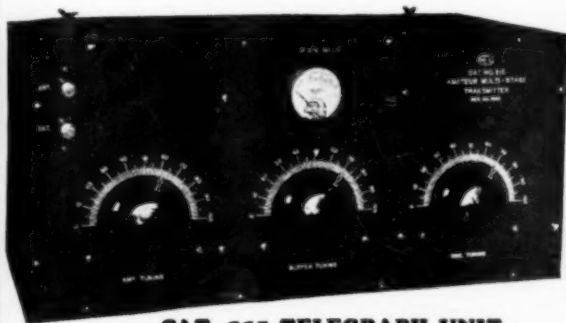
This thing has run on like the proverbial brook, but I'm through now — till next time.

— A. D. Middleton, W8UC, W8AKA

CRYSTAL CONTROL TONE

for C. W. Transmission

REL Cat. No. 215 Basic CW Telegraph Unit is the typical modern multi stage transmitter for the amateur who desires to use the best. Frequency flexibility throughout each amateur band with crystal controlled note at all times. Shift quickly and easily anywhere in the bands.



CAT. 215 TELEGRAPH UNIT

The Cat. No. 215 CW transmitter kit has been specially priced to meet the demands of every amateur. The price including one set of plug-in coils for any of the three popular bands is **\$56.00**. (When ordering specify for which band you desire the coils.) Additional coils to cover other bands may be purchased at \$7.00 per set of three.

The REL Cat. No. 215 transmitter kit is furnished with all necessary parts including metal case, drilled and engraved aluminum front panel and a very concise instruction booklet giving information on the assembly and operation. Extremely simple to operate. Consumes minimum amount of power. Employs standard broadcast receiver tubes. May be operated from B batteries, ordinary B eliminators or other similar sources delivering 300 volts D.C. A complete low power transmitter ready for immediate operation. Employs UY-227 master oscillator tube, UY-224 screen grid buffer tube and UX-245 power amplifier tube. Will deliver 10 watts to the antenna as a CW telegraph transmitter.

100% MODULATION

for Phone Work

REL No. 225 modulator and speech amplifier unit designed to operate in conjunction with Cat. No. 215 CW telegraph transmitter functions as 100% system modulator. When used with Cat. No. 215 unit will deliver 30 watts on modulation peaks into the antenna.

The REL Cat. No. 225 modulator and speech amplifier kit comprises all apparatus necessary and also includes metal cabinet and drilled and engraved aluminum front panel. The cabinet has the same height and depth dimensions as the transmitter. The modulator may be placed directly alongside of the Cat. No. 215 thereby giving a very neat appearance.

The same type of power supply may be used except that the plate voltage necessary will be 550 to 600 volts. The UX-250 tube is employed as modulator and the UY-227 tube is employed as speech amplifier. The No. 225 modulator kit sells for **\$42.00**.



CAT. 225 MODULATOR UNIT →

The amateur who desires a modern station should install both of these units. He will then have a perfect CW transmitter and a clear 100% modulated phone set. REL will be glad to forward you literature describing these two units. Mention Booklet No. 50.

RADIO ENGINEERING LABORATORIES, INC.
100 WILBUR AVENUE, LONG ISLAND CITY, N. Y.

Cunningham RADIO TUBES

—a good tonic
for your radio—



take your tubes
to your radio dealer—
ask him to

test them

and replace "tired" ones
with new, wide-awake

Cunninghams

New tubes make an old radio
good and a new radio better

Standard Since 1915

E. T. CUNNINGHAM, INC.

New York Chicago San Francisco
Dallas Atlanta

How Filters Work

East Bridgewater, Mass.

To Whom It May Concern:

I have built me a filter for my transmitter in compliance with the new regulations requiring us hams to have a nice d.c. plate supply, and from all outward appearances here's how it works:

I sit down and tap the switch marked "power" and the juice starts to run around the primary of the transformer. After a few trips around it jumps over to the secondary, and in jumping over it seems to get all het up. This is accompanied by an increase in voltage — guess it even gets as much as ten times the original; anyway it's there, and seeing there's no place for it to go it makes a bee line for the nice new 866 I paid so much for.

The only reason I put this 866 in there is someone told me it would come in handy. These 866's are funny tubes, seems they will only pass the juice in one direction, so some of it has to wait, but the rest runs merrily through.

After pushing and fighting to pass through this limited space the current meets its first obstruction — one of those things called chokes. Now when the current comes out of the 866 it is hopping around and making all sorts of fancy curves. The choke doesn't like this worth a darn, so the only thing for said choke to do is to oppose it all it possibly can, which it does and how! After the juice has been squeezed a little it passes through and comes to a condenser and just keeps on crowding into this poor condenser until it can't hold any more. Naturally after it can't hold any more the current must go somewhere, so the condenser starts to push it out, and lo! it isn't making all those fancy curves now, it is beginning to act quite nice. These condensers act a lot like a pitcher of water when you are filling it from a faucet — the water runs in rather harshly and when the pitcher is full, it naturally runs out, but it runs out so much smoother than it ran in. This is just what happens in the condenser.

After passing out of the condenser the poor overworked juice only meets another one of those chokes like before, and this choke isn't a bit more partial to currents that are making funny curves than the first one was, so it just tends to oppose the current until it gives in and acts at least a little better. Now after all this trying to get out, the current meets up with another condenser and goes through about the same lot of red tape. After all the choking and condensing this current has been put through any one would think it had had enough, and I think if I had to go through all this I would myself be willing to calm down and act good, but there is one thing more for this current yet. This current isn't always tamed completely and after getting through is apt to get up a little spunk and act naughty, so we just keep it busy. This is easily accomplished by putting a resistance of the proper value right across the output of this here power supply. This keeps the juice busy and I suppose helps to keep it down-hearted so it won't rise up and revolt.

And I get nize DEE CEE.

— E. E. Ester, W1CFI, W1FIB

ALL OVER **THE RADIO WORLD** **Short-Wave Experts** **Praise HAMMARLUND** **EQUIPMENT!**

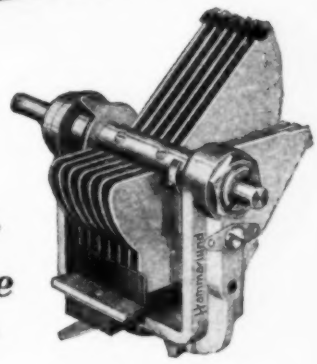
New Two-Tube Short-Wave Receiver Kit

Here's fun for the short-wave fan. A remarkably efficient two-tube distance getter, with regenerative detector and use with the new 230-type, 2-volt battery tubes. Easily constructed from the Hammarlund kit, containing all parts.

It includes the famous Hammarlund Drum Dial, the new Hammarlund wide-spaced short-wave "Midline" condenser and the improved Hammarlund space-wound plug-in coils. Covers 15 to 105 meters. Extra coils are available covering wave bands from 10 to 225 meters.

Makes a wonderful tuning unit for the short-wave experimenter.

A New and Better Short-Wave Condenser



Heavy, widely-spaced plates for strength. Less chance for accumulation of dust causing capacity changes in close tuning.

"Parmica" insulation, the remarkable new material which so closely matches the ideal dielectric efficiency of dry air. Current loss greatly reduced; sensitivity and selectivity much improved.

Double cone, smooth-operating bearings — easily adjusted for wear, non-corrosive brass plates with tie-bars. Strong aluminum alloy frame.

A real short-wave condenser in the three most desirable sizes: 150, 125 and 100 mmf.

Write Dept. Q-10 for Details of
Hammarlund Short-Wave Equipment.

HAMMARLUND MFG. CO.
424-438 W. 33rd Street New York

For Better Radio
Hammarlund
PRECISION
PRODUCTS

A New Oil Impregnated TRANSMITTING CONDENSER



This new "Acrakon" oil impregnated transmitting condenser has been designed and built to meet the demands of amateurs for a condenser that can be depended upon for long service.

The units are remarkably low priced because they are sold direct from the factory to you.

Write Today for Information!

CONDENSER CORP.
OF AMERICA
259 Cornelison Ave.
Jersey City, N. J.

The Ham Spirit

Lineville, Ia.

Editor, *QST*:

Permit me to extend my views on a question upon which I have heard some comment.

I recently heard some old-time "hams" expressing the opinion that hamfests were dying out and that they didn't receive any benefit from attendance at them.

I am a new ham and attended my first convention of the Midwest Division last May. I can certainly say that although I didn't assimilate all the vast amount of technical talks which were given for my benefit, I caught the spirit of the convention in no uncertain way. After hearing the speakers at the banquet and seeing the fine fellowship shown by everybody to everybody, even including the "scrubs" like myself, the good old League suddenly blossomed out into more than just \$2.50 a year for *QST*. The inspiration carried back home by me has re-kindled my ham ambitions and thoroughly sold me on ham radio.

— Joe Duncan, W9DDX

Low-Loss

Aukland, N. Z.

Editor, *QST*:

In the October, 1923, issue of *QST* under the heading "Short Wave Tuner Design," K. E. Hassel started the "low-loss" revolution in receiver construction, the influence of which was felt wherever *QST* was read, and need I add, wherever radio apparatus was bought and sold. This low-loss campaign is forgotten now, but while it did last its effect was one of universal benefit. At the risk of being accused of looking forward backwards I might say that I consider the years 1924 and 1925 the most momentous in all amateur radio history and the low-loss tuner had quite a lot to do with that. But what of it anyway — we have real high frequency amplifiers to-day, plenty of gain per stage and so on, and nobody can deny that it is better this way.

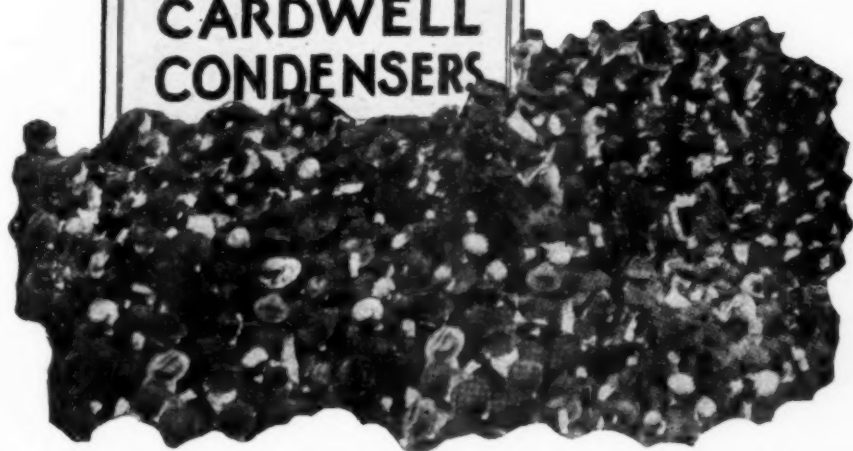
Advance? Certainly — but what I want to draw attention to is this — that evidence of taking pains in design and construction is less apparent in a 1930 receiver than in a low-loss receiver of 1924, and this is a very undesirable sign. I am disappointed to see *QST* publish descriptions of a tube-base receiver with no footnote pointing out that a fast job and not absolute efficiency has been the first consideration. Of course this kind of construction is the easy way, but I can't believe that it is the best way; high-frequency coils wound around tubes of doubtful composition, fields writhing among contact pins and terminals and taking in the baseboard and shield on the way, oversize ticklers — these things are OK in the monitor but — shades of Ballantine — how about the response to weak signals? I see the grid variometer on its way back and shudder as I contemplate the possible return of a revamped tens and units switch.

During 1929 Hull did for the transmitting side what was done in those pioneer low-loss receiver

WHAT! NO SLUMP?

THERE HAS BEEN NO SLUMP

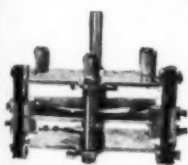
IN THE ADAPTATIONS OF
**CARDWELL
CONDENSERS**



NEW adaptations of long known fundamentals continually reveal some necessity for condensers different in form from the usual standard types heretofore found adequate.

Are you keeping abreast of modern developments in the fascinating field of ultra-shortwave radio communication? Up-to-date experimenters will at once see the advantages of a variable condenser with an adjustable stator allowing the maximum capacity to be set anywhere from 10 to 50 mmfds. and "spreading" the tuning correspondingly—such a condenser is our 201-E shown below.

With the ever-increasing traffic on the shortwave channels—selectivity and sensitivity become of paramount importance in the modern radio receiver. Many operators acclaim the merits of the push-pull system, using double section variable condensers in the tuning circuits. To meet this demand our 202-E has been developed giving a total capacity of .00075 mmfds. with 2 sections in series. With interchangeable coils a tuning range of 5 to 80 meters can be covered readily.



The 201-E (2 plates). A taper plate condenser for short wave receivers. The stator plate is adjustable, affording maximum capacities of from 30 to 10 mmfd. Price \$4.

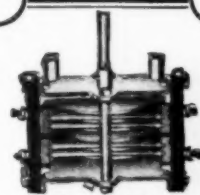
CARDWELL CONDENSERS

THE ALLEN D. CARDWELL
MANUFACTURING CORPORATION

81 Prospect Street, Brooklyn, N. Y.

Since broadcasting began

"THE STANDARD OF COMPARISON"



202-E (Split Stator)
.000300 mmfds. Sections in multiple
.000075 mmfds. Sections in series
.000150 mmfds. Per section

Every TRANSMITTING AMATEUR Uses These Forms



MEMBER'S CORRESPONDENCE STATIONERY
One color (black) heading now being used at greatly reduced cost to members.

Write your radio letters on League stationery — it identifies you.

Lithographed on 8 1/2 x 11 heavy bond paper.

100 sheets \$50c
250 sheets \$1.00
500 sheets \$1.75

Postage Included

THE AMERICAN RADIO RELAY LEAGUE HEADQUARTERS, HARTFORD, CONN. U. S. A. RADIOGRAM				
CITY OF ORIGIN HARTFORD, CONN.	STATION OF ORIGIN 912B	NUMBER 979	DATE OCT 8	CHECK 47
TO: BERN E. BELLEFRAIN W2CIC		THIS MESSAGE WAS RECEIVED AT OFFICE OF THE DIRECTOR 1000		
RELAY CHAIN BEING ORGANIZED BY RINGS OF ELEMENTS TO OPERATE BETWEEN THE PACIFIC COAST AND CHICAGO CALLS FOR CLOSEST COOPERATION BETWEEN IOWA AND ILLINOIS STOP 130- BEST THAT YOU COMMUNICATE WITH BRADFORD ON THE SUBJECT ALOIS R. BUBER				
Rec'd Sept	RADIO STATION W2CIC	LOCATED AT POST OFFICE BOX 1000	DATE 10/8/28	TIME 8:22 P.
OPERATOR BP				

OFFICIAL A.R.R.L. MESSAGE BLANKS

Most convenient form. Designed by the Communications Department of the A.R.R.L. Well printed on good bond paper. Size 8 1/2 x 7 1/4. Put up in pads of 100 sheets. One pad postpaid for 35c or three pads for \$1.00.

RADIOGRAM AMERICAN RADIO RELAY LEAGUE	
FROM To:	DATE
TIME RECEIVED 1000	AT RADIO STATION 1000

MESSAGE DELIVERY CARDS

Neatest, simplest way to deliver a message to a near-by town. On U. S. stamped postals 2c each. On plain cards (for Canada, etc.) 1c each, postpaid.

American Radio Relay League
1711 Park Street
Hartford, Conn.

articles. That is, he showed how simple apparatus, if given care in design and construction, can return first class results. I hope that the excellent advice included in the High-C issues will last a year or two before going the same way as the real genuine low-loss principle! The transmitters illustrated in recent *QST*'s are certainly excellent models and I look forward to seeing again in *QST* receivers which could stand searching criticism as to constructional design, just as these transmitters can stand it.

My critics might suggest that air-space coils, etc., are not necessary now we have amplifiers which amplify, but I say that many amateurs do not use amplifiers and that they should have good information on simple tuners. Moreover, such information might foster that characteristic of the real amateur of every realm of recreation, namely the desire to finish his work to perfection. This idea should pervade every amateur radio station. If the low-loss doctrine can be resurrected, good simple receivers will make worthy companions for the High-C transmitters and the crystal control station will be equipped with a superlative radio-frequency amplifier receiver.

Please excuse this criticism of things as they are; it is intended to be constructive and is perhaps just the result of early principles dying hard! But after all they were good principles.

— T. R. Clarkson, ZLI1Q

More Mental Fading

75 New Haven Avenue,
Milford, Conn.

Editor, *QST*:

Just received August *QST* and was reading the letter from ex-W2ADH entitled "Mental Fading." While reading it, it struck me that one could apply the old adage "There're two sides to every question." In this case, I took the funny side (as ever!). On the one side we have the reception (or deception) of fading signals. On the other side (the funny side) we have the transmission of fading signals.

I don't think there is anything so amusing at times (although sometimes exasperating, too) than to try to copy a fellow who sends part of a word and then forgets either how to spell it or how much of it he has already sent. No foolin', after a few minutes you can time these "mental fadings." And some of the spelling would do credit to Einstein when it comes to figuring it out.

But I cannot say all this without saying I'm no exception. Often in the wee hours, when everyone is asleep, and when every touch of the key sounds like a wheel going over a joint in the track, I find that I begin to have spells of mental fading. I have traced this to a difference of opinion in my brain cells. Half of them want to call it a day and pull down the shades, while the other half are trying to keep up with the key. The deciding factor in this domestic struggle is whether DX is in order or not. If not, then I do a complete mental fade-out. Hi!

There is just one more thing in connection with

A SAFE GUIDE

in the selection
of insulation for
Radio Transmitting
and Receiving Sets



OVER 300 broadcasting stations, leading radio telegraph systems, the United States Army, Navy, Air Mail, Coast Guard and Ice Patrol Services, explorers like Commander Byrd, and exacting amateurs everywhere have utilized PYREX Insulators in many spectacular achievements.

Regardless of whether you are sending or receiving — on land, sea or airplane — you should be thoroughly familiar with the PYREX Antenna, Strain, Entering, Stand-off and Bus-bar Insulators that are helping these leaders to make radio history.

The new PYREX Radio Insulator booklet lists all types and sizes with data that you will want for ready reference.

Return the coupon for your copy, and if you want further advice on any insulation problem, our Technical Staff will answer your questions promptly.

Send
the coupon
for your copy

CORNING GLASS WORKS
Corning, N. Y.

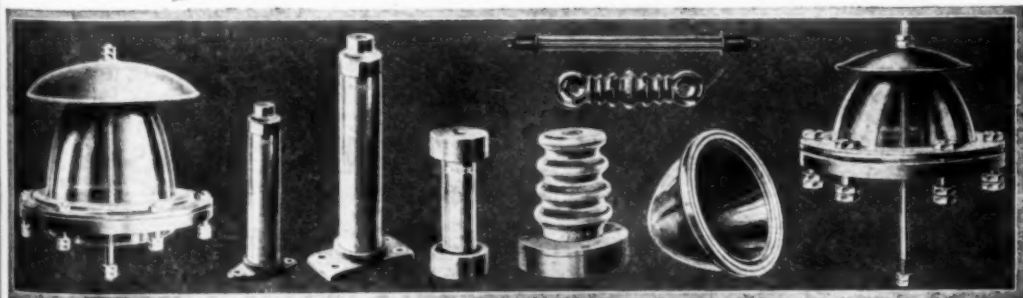
Gentlemen:

Please send me copy of your new
bulletin on Radio Insulators.

Name

Address

QST 9-30



Say You Saw It in QST — It Identifies You and Helps QST

BUILD YOUR POWER-PACKS WITH PUNCTURE PROOF FILTER CONDENSERS

AND ELIMINATE, ONCE FOR ALL TIME, THE DANGER OF HIGH-VOLTAGE BREAKDOWN

Prominent Radio Manufacturers, who have been using Mershon Electrolytic Condensers for years (over 3,000,000 of them in use today), continue to do so, for they provide better filtering, greater reliability and almost unlimited life — at lower cost.

In building power-packs for receivers, transmitters or power-amplifiers (or in repairing them) your problems closely parallel theirs.

You Can Profit from Their Experience

THIS NEW BOOKLET SHOWS YOU HOW



It is the most complete, helpful booklet on Electrolytic Filter Condensers ever published. In successive chapters it deals with voltage surge effects, condenser life limits, moisture, safety-value action, cost and size, and carefully and completely analyzes them from a very practical point of view.

It contains complete descriptions of the newest types of Mershon Electrolytic Condensers, and shows effective circuits for their use. Although priced at 10 cents, it will be sent FREE on request to QST readers.

SEND FOR FREE COPY TODAY

The Amrad Corporation
355 College Avenue
Medford Hillside, Mass.

Please send me a FREE copy of your new booklet, "Puncture Proof Filter Condensers."

NAME.....

STREET.....

CITY.....

STATE.....

64

Say You Saw It in QST — It Identifies You and Helps QST

this mental business, more or less funny, as it has to do with the psychological nature of the individual operator. I mean when one has company. It seems that while your visitors are looking at the cards, certificates, etc., they are comparatively quiet, but as soon as you start to "show 'em how it's done" they begin to ply you with questions. I haven't yet found an op who can talk and send simultaneously except on CQ-CQ. Hi.

Guess I'll stop raving now before someone sez I've got a case of permanent mental fading, so 73's and I'll see you some more.

— Emil F. Scholz, W1AMQ

A Mere Youngster

Curtice, Ohio

Editor, QST:

Well, here I am for another year in good old QST and can now say I am in my 80th year young. Have you any member older and if so can they pen a letter like this without glasses? Hi!

— Dr. Geo. W. Kirk, W8ARJ

The handwriting was FB — much better than the samples we get from most young squirts. — Editor.

I.A.R.U. News

(Continued from page 50)

menters were granted temporary permission by the local radio authority to use the whole band of frequencies from 1900 to 1200 kc. outside of broadcasting hours. The temporary permit expires shortly, and it is not known whether it will be renewed, but in the meantime considerable use has been made of the upper end of the spectrum which comes within the tuning range of the average broadcast receiver. Spasmodic working has been undertaken around 1900 kc., but as long as favorable conditions exist on the lower frequencies it is not expected that much activity will be shown there.

From one of the 1200-kc. stations in Victoria an interesting experiment is being undertaken in conjunction with the University of Melbourne, in the measurement of the height of the Heaviside layer over Australian territory, which will provide interesting knowledge.

Australian amateurs are getting ready for the next annual convention of the Federal Council, which will take place in Melbourne in September, and Victorians will have the opportunity of entertaining visiting delegates at that time. The Federal Council corresponds to the A.R.R.L. Board of Directors, and the various items discussed will be advised later.

The following British Notes combine the reports for June and July, as both were received within the month.

(Continued on page 66)

The Communications Department

F. E. Handy, Communications Manager
E. L. Battey, Asst. Coms. Mgr.
1711 Park St., Hartford, Conn.



Navy Day Competition October 27th

A NAVY DAY program of telegraphic broadcasts to amateurs has been arranged just as last year under the auspices of the Navy League of the United States. To prevent any possibility of overlapping transmissions from different stations, and to insure that everybody has a chance to get the messages, three transmitting stations have been selected this year. Each station will send a different Navy Day broadcast simultaneously on two frequencies in accordance with the schedules given herewith. Navy Day will be Monday, October 27, 1930. It is suggested that you mark the date in the log or on the calendar above the operating table, or wherever necessary to insure your participation.

The telegraphic broadcasts will be sent to all amateurs including the nearly two thousand members of the Naval Communications Reserve. All participants will be cited in the Navy Day Honor Roll, to appear in QST. Every one who listens and copies the broadcasts has a chance to "make" the Honor Roll. The more of the messages you can copy and forward to A.R.R.L. Headquarters, the higher will your name stand in the list. There will undoubtedly be other messages sent from the District Commandants through some of the District U.S.N.R. stations, and we shall be glad to have copies of these messages, but please bear in mind that only the three messages sent from NAA, NPG and WIMK count in the receiving competition. There is a good chance that you may be one of the few operators to receive special commendation from the Secretary of the Navy for having submitted the most accurate and complete copies of the three broadcast messages. If large numbers of perfect copies are submitted, legibility and neatness will determine the relative standing of the high operators. Receiving conditions and difficulties peculiar to certain localities will be considered in making the awards.

A sensitive receiver and an accurately calibrated monitor or frequency meter will enable you to get all set for the contest before October 27th. It will pay to spend a little time in preparation — in determining the receiver dial settings for the different frequencies which will be used. Listening in advance of the competition at the same time of day as these broadcasts will be sent will help to determine which of the several frequencies enumerated will give the most copiable signals in your location. Below is the schedule that will be followed.

It is requested that care be taken by other stations using these frequencies to avoid unnecessary interference with these transmissions. Please pass the word about the schedules around to other operators, too. It is hoped that as many amateurs as possible will participate in the Navy Day arrangements.

Check your timepieces before the broadcasts so that you will not miss out on any of the messages. All three stations will transmit at exactly the hours given. Your timepiece must be right if you want to get all of the messages.

Many of us belong to the U.S.N.R., but this is an opportunity giving us all a chance to show interest and pride

in our Navy, whether we happen to belong to the Communication Reserve or not. We can demonstrate our skill in copying and perhaps learn some new facts about the Navy and the Naval Reserve at the same time we have a good time twirling the dials. To a few this contest may look "too easy," but let us add that to make 100% perfect copy requires a sincere effort and considerable proficiency. Copy everything that you can, OM, and mail it next morning to A.R.R.L. Headquarters, Attention the Communications Department.

Traffic Briefs

Mr. Byron E. Dickensheets, custom radio set builder, piano tuner, Kodak finisher, and radio repairman, writes us under date of February 4th that he noticed that WSATUS has a free ad in our February issue (obtainable from our Circulation Department at 25¢ a copy). This ad — look it up, quick!! — concerns a dime store bargain in 210's.

Now, Dickensheets says he can go ATUS one better. He says that he has one of these tubes — used only eight hours — which he will sell for a low-down of \$3.49. Characteristics: filament voltage, 7.5; plate voltage, 425; output, awful. The filament leans anxiously toward the northeast corner of the grid, as though expecting some electrons to jump over excitedly. This minor defect, however, will be no deterrent to efficiency if the directions for use are carefully followed. They are: (1) Lay tube gently on its southwest side. (2) Allow it to drink from the fountain of youth (filament transformer) for one night. Upon rising in the morning it will be found that the plate current will have risen to a value of 3.002 milliamperes. In this condition the tube will safely handle any voltage that you may care to apply.

Byron solicits inquiries, which should be addressed in his care at Green Tree, Ohio (see unabridged atlas).

(EDITOR'S NOTE. — Viewing the tremendous volume of mail that has resulted from this free ad in February QST, we have decided that WSATUS is not only "at us" but against us, too. Therefore we reserve the right to decline all requests for free publicity that may come as a result of the favor shown to Uncle Dickensheets, which was given only in consideration of the surprising results which have been obtained from this most amazing tube.)

SHALL WE HAVE A BOUNTY CONTEST?

In many states the authorities have seen fit to offer specific bounties for the scalps of particularly obnoxious and harmful rodents. This gives us an idea. For many years amateur radio has been pestered by the pernicious CQ hound. Should we offer a bounty for him?

W9EUR sends in a report that he heard one the other night and, being in an excessive good humor, he patiently stood by to the bitter end and counted 110 CQ's. One hundred and ten CQ's!!

We shall consider offering a prize to the amateur counting the largest number of CQ's that are sent consecutively without interruption of signing. Of course, we realize that this sort of an offer will bring in many a scalp from offending CQ hounds, and therefore the prize will eventually become harder to obtain. Suggestions are solicited as to the sort of prize we should offer, and further rules for the contest.

Station	Freq. (kc.)	W.L. (m)	Starting Time	Message from
NPG, Navy Dept., San Francisco, Calif.	4385 8770	68.4 34.2	7:30 p.m. (P.S.T.) or 10:30 p.m. (E.S.T.)	The Secretary of the Navy
NAA, Navy Dept., Washington, D. C. (Arlington)	4015 8870	74.7 37.4	7:30 p.m. (E.S.T.) or 4:30 p.m. (P.S.T.)	The Secretary of the Navy
WIMK, A.R.R.L., Hartford, Conn.	3575 7150	83.9 41.9	9:30 p.m. (E.S.T.) 6:30 p.m. (P.S.T.)	Lt.-Comdr. Hiram Percy Maxim, U.S.N.R., Presi- dent of the A.R.R.L.

QST FOR OCTOBER, 1930

Know the Law—and Take Heed

By Rufus P. Turner*

OWNERS of amateur stations are reminded that too much must not be taken for granted in the operation of their transmitters under existing radio legislation. Uncompromising laws and regulations governing amateur communication have been enacted, the most urgent and weighty of them appearing upon the station license. Practically all of them are liable to technical violation, through carelessness, as may be discovered on careful perusal. Too few have taken the time, however, to examine these laws printed on the license form for their attention. Not so many have gone beyond merely glancing at the license furtively enough to catch the call letters, having only the vaguest idea of what else appears thereon, and letting it go at that. Nor does the body of the license seem a matter of very grave concern to them.

It is imperative that every amateur provide himself with a copy of the Radio Act of 1927.¹ It is not alone sufficient that this pamphlet occupy a conspicuous place on the station bookshelf; it must be studied and the laws relating to amateur communication well digested and put into force. In its absence, which is hardly excusable at this time, the regulations printed on the station license should be substituted. The absence of loopholes in these rules might well be noted with care.

The writer calls attention to the following regulations involving technicalities:

1. That the station license authorizes use of the transmitter only at the location (both street and number) specified thereon. To remove the sending apparatus over as short a distance as next door to the authorized address, resuming operation therefrom in absence of official sanction, is unlawful. It is just as much of a misdemeanor to sign one's personal call at another station.

2. Licenses issued to installations specified in the application as permanent in nature, do not authorize transportation of the apparatus as a portable station. Separate licenses are assigned portables.

3. Laws and regulations enacted subsequent to issuance of a station license also apply and the fact that the license antedates a new regulation must not be misconstrued. Amateur station licenses are "subject to the provisions of the Radio Act of 1927 SUBSEQUENT acts and treaties and all regulations heretofore or HEREAFTER made. . . ."

4. The frequency of the waves emitted must be as constant and free from harmonics as the state of the art permits. Unsteady waves are unlawful and must not be considered otherwise. Off frequency operation is illegal and subject to the heavy penalties prescribed in the Radio Act.

5. A number of 'phone operators should particularly note the regulation providing that "the station operator must announce the call letters and location of the station as frequently as may be practicable when the station is in operation." And at the beginning and end of each transmission is MOST practicable!

If amateur communication is to be at all improved, if we are going to strive toward the attainment of the criterion of perfection, then primarily we must see to it that our stations are operated by men and women who know the law and who know it well enough to remember its provisions and put it into force during operation. It is quite an unpardonable sin for a live amateur who should be both prudent and vigilant to be without a copy of the Radio Act of 1927. Keep the pamphlet handy at all times and abide by Federal ruling.

*W1AY, W9FZN, 5520 Jay St., N.E., Washington, D. C.

¹ Copies of the Radio Act of 1927 may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C. for 5 cents each. The English translation of the International Radio-telegraph Convention (Washington, 1927) may be obtained for 40 cents from the same source.

W1MK

A.R.R.L. Headquarters' Station W1MK operates on frequencies of 3575 kc. and 7150 kc. Robert B. Parmenter, "RP," is the chief operator; his fiat is familiar to most of the amateur fraternity. Occasionally other members of the

Headquarters staff operate at W1MK. Their personal signals may be found in the QRA Section of QST.

Throughout the following schedules Eastern Standard Time will be used.

OFFICIAL AND SPECIAL BROADCASTS are sent simultaneously on 3575 kc. and 7150 kc. at the following times: 8:00 p.m.: Sun., Mon., Tues., Thurs., and Fri.

10:00 p.m.: Mon. and Fri.

12:00 p.m. (midnight): Sun., Tues., and Thurs.

GENERAL OPERATION periods have been arranged to allow everyone a chance to communicate with A.R.R.L. Headquarters. These general periods have been arranged so that they usually follow an official broadcast. They are listed under the two headings of 3500 kc. and 7000 kc. to indicate whether the watch is devoted to listening on the 80-meter band or to the 40-meter band.

3500 kc.

8:10 p.m. to 9:00 p.m. on Sun., Mon., Tues., Thurs., and Fri.

10:00 p.m. to 11:00 p.m. on Tues. and Thurs. (No OBC sent before these periods.)

12:00 p.m. to 1:00 a.m. (or later) on Sunday night (Monday morning).

7000 kc.

10:10 p.m. to 11:00 p.m. on Sun., Mon., and Fri.

12:00 p.m. to 1:00 a.m. on the following nights (actually on the morning of the day following): Mon., Tues., Thurs., and Fri. (Only on Tues. and Thurs. does the OBC precede these periods.)

SCHEDULES are kept with the following stations through any of which traffic will travel expediently to A.R.R.L. Headquarters, on 3500 kc.: W1ACH, W1BKB, W1CTI, W1VB, W2JF, W3AVI, W3BWT, W3CXM, W9OX, VE9AL, NEDF; 7000 kc.: W4SK, W6DEP, W6OJ.

QSL CARDS for W1MK should be addressed in care of A.R.R.L., 1711 Park Street, Hartford, Conn. A complete log of every transmission is made and W1MK is always glad to send any station worked a card, but frequently cards are lost when sent direct to the station at Brainard Field. W1MK always QSLs upon receipt of card from station worked.

Wanted—Code Practice Volunteers

EVERY year at this season we devote space in this department to the listing of schedules of 1750-ke. amateur stations which broadcast information and code instruction to beginning amateurs. As this issue goes to press we are going over our list of "code practice" stations preparatory to presenting a revised list in the November issue. Newcomers to the amateur ranks are learning to rely upon the 1750-ke. transmissions of stations sending code instruction, and during the last season many were able to bring their speed up suitably to enable them to secure licenses. The new men need code practice more than anything else, instruction in amateur operating practice, and two-way work with patient, experienced operators as soon as they secure their licenses to increase their proficiency in using their stations. Thus it is that we are calling for volunteers to send code practice in the 1750-ke. amateur band. Don't you want to help out by offering your station and a few hours of your time each week to these beginners?

Both c.w. and radiophone stations can engage profitably in broadcasting and two-way work for beginning "hams." Radiophone volunteers are really preferred, however, as by using both microphone and key instruction can be given most efficiently to the listeners. Last season those who took part in this work had gratifying results and built up large audiences and many friends, who listened regularly as soon as the schedules were announced. Let us tell you about W9BSP's success with the work.

If you have a 1750-ke. 'phone or telegraph transmitter and can engage in this most worthwhile work, please drop us a line at once, giving data on your exact frequency, hours of schedules, etc., and prepare to follow your schedule as soon as it is in print. We shall be glad to send you some mimeographed ideas and helps which will assist you in putting this service over to those who copy your transmissions.

OFFICIAL BROADCASTING STATIONS

(Local Standard Time)

CALL	FREQUENCY	SCHEDULES	CALL	FREQUENCY	SCHEDULES
W1ANH	3990	Mon., Wed., Sat., 7:15 p.m.; Tues., Sun., 10:00 p.m.	W7AAW	7150	Mon., Wed., Fri., 2:30 p.m.
W1APK	3600	Tues., Thurs., Sun., 9:00 p.m.	W7DD	7200	Mon., Thurs., 7:30 p.m.
W1AQL	3846	Mon., Wed., Fri., 7:00 p.m.; Sun., between 1:30 p.m. and 6:30 p.m.	W7DD	3900	Mon., Thurs., 10:30 p.m.
W2AET	7142	Tues., Thurs., Fri., 11:00 p.m.	W7DL	14,200	Sun., 4:30 p.m.
W2AZV	3660	Mon., Thurs., 9:00 p.m. (during Aug., Sept., Oct.); Sun., Wed., Fri., Sat., 7:15 p.m.; Sat., 12:30 p.m. (after Nov. 1st).	W7FL	7142.8	Mon., Wed., Fri., 11:30 a.m.
W2BGC	3636	Daily except Tuesday 3:00 a.m.	W7FL	3540 (phone)	Tues., Thurs., midnight.
W2BIV	7200	Sat., Wed., 6:00 p.m.	W7IZ	14285.7	Sunday 3:00 p.m.
W2BIV	14,150	Sun., 2:00 p.m.	W7FL	7140	Sun., Thurs., 9:00 p.m.
W2BO	7130	Sat., Sun., 11:00 p.m. (after Nov. 1st).	W7IZ	28,000	Sun., 1:30 p.m.
W2FF	7110 (cc)	Mon., Fri., 8:00 p.m.	W7OV	7020	Mon., Wed., Thurs., Fri., 7:00 p.m. and 10:00 p.m.
W2FF	14,050	Mon., Fri., 6:00 p.m.	W7OV	3950	Mon., Wed., Thurs., Fri., 7:00 p.m. and 10:00 p.m.
W2FF	14,220 (cc)	Sun., 6:00 p.m.	W7PL	3540 (phone)	Tues., Thurs., 8 p.m.
W2PF	3910	Sat., 10:30 p.m.	W7PL	7080 (cc)	Tues., Thurs., 5 p.m.
W3ALE	7300	Mon., Thurs., 7:00 p.m.	WSAFM	7018	Mon., Wed., Fri., 7:15 p.m. and 9:00 p.m.
W3ALE	3600	Mon., Thurs., 10:30 p.m.	WSAFM	14,200	Sun.
W3BWT	3680	Sat., 7:30 p.m.	WSBCZ	7280	Daily 7:00 p.m. and 10:00 p.m.
W3CDQ	7200	Sat., 10:30 p.m.	WSBWP	3580	Daily 5:00 p.m. and 8:00 p.m.
W3CDQ	14,250	Sun., 11:00 a.m. and 3:00 p.m.	WSCEQ	7160	Mon., Tues., Thurs., Fri., 7:30 p.m.
W4AA	14,200 (cc)	Daily, 5:30 p.m.	WSCRA	3705	Mon., Wed., Fri., 7:00 p.m.
W4AA	7100	Daily, 7:00 p.m.	WSCRA	14,020	Mon., Wed., Sat., 5:30 p.m.
W4AA	3600	Daily, 8:30 p.m.	WSCRA	7040	Sat., 3:00 a.m. (Effective Jan. 1, 1931).
W4ALH	7143	Tues., Thurs., Sat., 7:00 a.m. and 8:30 p.m.	W8DLG	3500	Tues., Fri., Sun., 7:30 p.m.
K4KD	7100	Mon., Fri., 10:30 p.m.	W8DLG	7000	Tues., Fri., 12:00 midnight.
K4KD	14,200	Sun., 10:00 a.m.	W8DME	3650	Mon., 7:00 p.m.
W4NG	14,250	Daily except Sun., 6:30 a.m.	W8DME	14,200	Sat., 7:00 p.m.
W4NG	7000	Daily except Sun., 9:00 a.m.	W8DLJ	7020	Mon., Wed., Fri., 10:30 p.m.
W5AHH	7116 (cc)	Mon., Wed., Fri., Sun., 1:00 p.m.	W8DLJ	3090	Daily 5:00 p.m. and 8:00 p.m.
W5AKP	7160	Sun., Thurs., Sat., 7:30 p.m.; Sun., 1:00 p.m.	W8PL	7030	Mon., Wed., Fri., 5:30 p.m.
W5AQX	7160	Sun., Wed., Sat., 8:15 a.m.; Sun., 11:00 p.m.	W9AAB	7085	Tues., Thurs., Sat., 7:30 p.m.
W5ASQ	7100	Tues., Thurs., 9:00 p.m. and 11:00 p.m.	W9ACU	7030	Sun., 8:55 a.m.; Mon., 12:15 p.m.
W5BBF	7100	Tues., Thurs., Fri., Sat., 10:30 p.m.	W9ACU	14,150	Wed., 6:30 p.m.
W5BHV	7225	Daily, 9:00 a.m.; Mon., Wed., Fri., 10:00 p.m.; 12 midnight; Sun., 9:00 a.m., 3 p.m.	W9AIR	3900	Wed., Fri., 9:00 p.m.
W5BHV	14,050	Noon, daily.	W9BEF	7175	Mon., Wed., Fri., 10:15 p.m.
W5BJA	7003	Twice daily.	W9BEF	7000	Tues., Fri., 11:00 p.m.
W5BJA	14,006	Twice daily.	W9BEU	14,000	Sun., 5:45 p.m.
W5KX	3522	Mon., 11:00 p.m.	W9BJA	7160 (cc)	Daily 7:00 p.m.
W5MM	7050 (cc)	Tues., Thurs., Sat., 7:30 p.m.	W9BJA	3600	Daily 1:30 p.m.; Mon., Wed., Sat., 9 p.m.
W6ABF	3550 (phone)	Every eve. except Sun., 7:30 p.m. and 10:30 p.m.	W9BKJ	3805 (cc)	Mon., Thurs., Sat., 3:30 p.m.
W6ABK	7196	Mon., Wed., Fri., 7:00 p.m.	W9CBK	7100 (cc)	Sun., Thurs., 8:30 p.m. (for beginners.)
W6AGR	7030	Daily, 12 noon or 6:00 p.m. or both.	W9CSR	14,200	Thurs., Sat., 7:00 p.m.
W6AKW	7100	Sun., 5:00 a.m.	W9CSR	7160 (cc)	Daily except Sunday, 12:00 midnight and 9:00 a.m.
W6AMM	7280	Tues., Thurs., 7:00 p.m.	W9CTW	7160 (cc)	Thurs., 7:00 p.m.; Sat., 5:00 p.m.; Sun., 10:30 a.m.
W6AOA	3664	Mon., Wed., Sat., 7:00 p.m. and 10:30 p.m.	W9DFG	Mon., Wed., Fri., 1:00 p.m.
W6ASM	7100	Wed., Fri., 7:00 p.m.	W9DQN	7100	Mon., Wed., Fri., 7:00 p.m. and 11:00 p.m. Also whenever con- venient on Sundays.
W6AWT	3518	Tues., Wed., Sat., 5:30 p.m. and 11:00 p.m.	W9DZM	7290 (cc)	Mon., 7:00 p.m.; Tues., 7:30 a.m.; Sun., 3:00 p.m.
W6AXE	7275	Mon., Tues., Thurs., 10:00 p.m.	W9ECI	7140	Mon., Thurs., Sat., 8:00 p.m. Sends OB Sun. 5:00 p.m. on 14,200 kc.
W6BRO	7100	Mon., Wed., Fri., 7:30 a.m.	W9EKZ	7020 (cc)	Mon., Wed., Fri., Sun., 10:00 p.m.
W6BZR	7270	Mon., Wed., 6:30 p.m.	W9EPX	3836 (cc)	Sun., Mon., Wed., Fri., 9:00 a.m.
W6BZR	14,350	Fri., 6:30 p.m.	W9EPY	3855 (cc)	Mon., Thurs., 11:00 p.m.
W6TE	7000	Daily except Sun., 9:00 p.m.	W9ERU	7120	Daily except Sunday, 7:30 p.m.
W6CLS	3502	Every other week 12:00 p.m.	W9FCW	3750	Tues., Wed., Fri., Sat., 11:00 p.m.
W6CXW	7140	Mon., Tues., Wed., Fri., 7:30 p.m.	W9FCW	7100	Mon., Tues., Fri., 8:30 p.m.
W6DKV	7150	Mon., 6:30 p.m.; Fri., Sat., 10:30 p.m.	W9FFD	3590	Tues., Thurs., 8:00 p.m.
K6DV	7150	Sun., 1 p.m.; Tues., Thurs., Sat., 9 p.m.	W9FTA	7250	Mon., Wed., Fri., 7:00 p.m.
W6EAD	3700	Mon., Thurs., 7:30 p.m.	W9FTM	7140	Thurs., Sat., Sun., 9:45 p.m.
W6EDD	7300	Tues., Wed., Thurs., Sat., 6:00 p.m.	W9GDU	7300	Mon., Fri., 10:00 p.m.
W6EDK	3955	Daily except Sun. and holidays, 7:45 p.m.	W9GDU	14,000	Wed., 10:00 p.m.
W6EGH	14,300	Daily except Sun., 6:00 p.m.	W9GFL	7150	Tues., Thurs., Sat., 10:30 p.m.
W6ESA	7174 (cc)	Mon., Wed., Fri., 5:00 p.m.	W9SO	7120	Sun., 10:00 a.m.
W7AAT	7040	Daily, 10:30 p.m.			Daily except Sun., 9:00 a.m. and 7:00 p.m.; Sun., 1:00 p.m.

Traffic Briefs

W3BBW and W3BCX have been in partnership for over ten years without a break. Some record!

Some fellows say that DX schedules cannot be maintained on 14 mc. with any assurance of regularity, but W3CBT held a daily schedule with SE2A in the Sudan, Africa, for a long time without a single miss. He has also had schedules with English amateurs which have run over a month without a break. It is his belief that if more fellows would try this band and stay there, even if conditions were supposed to be unfavorable due to climatic changes, 14 mc. would be far better for almost any kind of work than is 7 mc.

QST FOR OCTOBER, 1930

W2APK worked and took a message from the blimp *Goodyear Defender* KHIDK, while it was at Miami, Fla., on April 5th. He also heard the *Defender* on April 3rd working CMLC, the altitude at that time being 15,000 feet over Miami. KHIDK works near the 7-mc. band.

From the Chair Warmer's Club bulletin: W9FYM wants to know if a wooden antenna pole is a radio log??

While QSO W2FN, K4KD heard HHK calling "CQ Rush Hartford, Conn." K4KD asked W2FN to QRX, called HHK and told him he could QSP Hartford in a few minutes. HHK gave him the message, which was a signal report and request for a special number to WTIC. K4KD gave the message to W2FN, who immediately delivered to

WTIC via land 'phone. The time involved was 45 minutes, 35 of which were a delay due to the 'phone being tied up. Had it not been for this tie-up, delivery from HHK in Panama to WTIC in Hartford would have been made in 10 minutes. FB!

W4AEA tells of receiving a message from a new ham recently which was followed by a long string of OBs and OM's. The new fellow explained that all the messages he had copied to date were so full of OBs and OM's that he thought they must be of great importance, and not wishing to omit them but not knowing where to put them in, he sent them at the end so that W4AEA could put them in where he thought they belonged MIM.

A WORD TO THE WISE . . .

"Off frequency operation is assuming serious proportions. I for one am sure that most of these stations will be found to operate without checking frequency at regular and frequent intervals. It is more than easy to be off frequency and be unaware of the fact unless frequent check is made.

I found myself off frequency several nights ago, exactly on 7000 kc., and no doubt a bit lower than that after operating for a while. This, in spite of the fact that no adjustments had been in the least disturbed, since last operation when the frequency was 7052 kc. I am at a loss to explain the shift in frequency, as it was necessary in order to get back to 7050 kc. to change the adjustments one whole degree on the dial of a 440-mmfd. condenser. But the very significant fact is this, that I did not on that occasion check frequency with the monitor against the receiver.

Needless to say, I do exactly that every time I start up the set since that time. It happened that this occurred on my W1MK sked and "RP" immediately informed me of my delinquency, for which I shall be eternally grateful to him. The foregoing will serve to prove to the unbelievers that off frequency operation is due, in most cases, I believe, to utter carelessness. That was the reason in my case, I'll frankly admit."

— K4KD

BRASS POUNDERS' LEAGUE

Call	Orig.	Del.	Rel.	Total
W6OP	129	119	929	1177
K1HR	370	164	346	880
W9DZM	116	148	102	366
K6EYV	22	43	262	327
W1MK	102	102	122	326
W9IR	35	75	178	288
K8CDD	122	51	78	251
K8DPG	39	56	144	239
W6ALX	31	104	100	235
W5VQ	24	15	192	231
W9AQH	7	66	156	229
W5AHJ	7	31	184	222
W8DYH	67	31	120	218
W6HEB	42	4	156	202
W1VM	133	66	2	201
W0DRG	34	107	38	179
W1CRA	29	63	84	176
W3BWT	38	53	64	155
W4AH	11	59	50	120
W6CUH	20	61	36	117
W6COS	33	53	30	116
W8HO	55	55	—	110
W5AGJ	55	55	—	110
W7ALM	32	53	18	103
W1BIG	41	57	—	98
W6EQF	18	67	5	90
W2QU	25	60	—	85
W8CX	25	50	7	82

All these stations appearing in the Brass Pounders' League are noted for their consistent schedule-keeping and dependable message-handling work in amateur radio. Special credit should be given to the following stations in the order listed responsible for over one hundred deliveries in the message month: K1HR, W9DZM, W6QP, W9DRG, W6ALX, W1MK.

Deliveries count! A total of 200 or more bona fide messages handled and counted in accordance with A.R.R.L. practice, or just 50 or more deliveries will put you in line for a place in the B.P.L. Why not make more schedules with the reliable stations you hear and take steps to handle the traffic that will qualify you for B.P.L. membership also?

Traffic Briefs

W9ANZ received his Extra First Grade Amateur ticket and obtained the special 14-mc. phone privilege. He worked

Brazil the first evening on the air with his new 14 mc. crystal-controlled 50-watt 'phone outfit!

A former first district amateur is now in Mexico signing X1NQ. W1CFT reports working X1NQ on December 4th and says his frequency is 7025 kc. and his tone r.a.c.

In the same mail, at the same second, minute, hour, day, week, month, year, etc., W5AJL received cards from San Jose, California, and San Jose, Costa Rica! One was from W6ANL, the other TI2WD. Can you beat this for a coincidence?

W1BWM has rigged up a high-frequency buzzer, battery and key in a brightly painted cigar box for the use of his 4½ months old son. This boy refuses to play with rattles and any other "kid" stuff now. FB! This will assure his early debut in amateur radio. Hi.

After reading in the I.A.R.U. News, December QST, how several of the headquarters staff talked with Secretary Warner at The Hague at the expense of the Netherlands government, W9BAZ asks if we would call that a "Dutch treat." Guess so, OM, but not the kind we are accustomed to. Hi.

W. M. Hardcastle, W6HZ, operator on the Grace Line to West Coast South American ports, asks why not have a page in QST devoted to traffic, press schedules, time ticks and notes on general operating conditions in various parts of the world for the gang at sea, said notes to be furnished by the gang. He feels sure that quite a few amateurs ashore would also use the information to advantage. He volunteers to do his part.

The idea has often occurred to us and such information as has come to our attention has always been used somewhere in the magazine. If we had enough suitable material, we should be glad to present it grouped under a heading, and perhaps these items would grow to the proportions of a department. Anyway, this is an invitation to all interested. Send your information to the Communications Department and we shall endeavor to do our part.

All stations are urged to develop the habit of covering the dial of their receivers after signing off with a station, or else making use of the abbreviation "CL," which means "I am closing my station." Many times a station will call you after you sign off another station, and if you but cover the dial once after each "SK" you stand a good chance of hearing some one calling you.

W7HP, Miles City, Montana, copies a weather report from NAA at 6.45 a.m. daily for the use of local airport officials in determining the weather conditions in other sections of the country. This is a service many other amateurs could very helpfully furnish their airports. FB, W7HP!

When meeting a friend on the street we do not hurry over to him, pat him on the back, and say, "Hello, John, Old Boy, sure glad to see you again. You're looking fine. I'll see you again. Good luck. Good-by," and leave him with his mouth wide open in amazement. No, we are somewhat sociable and give him a chance to speak his piece also. By the same token is it not wrong to work a fellow and say, "GA OM UR SIGS QSA4 RAC HR IN SQEEDUNK VILLAGE QRU CUL 73 VA"? W1AY-W9FZN abhors this sort of QSO, or this "snootiness," as he calls it, and pines for a little of the congeniality of by-gone days. Let's forget our craving for many QSOs and spend more time showing the chap at the other end that we know he is human.

The directional CQ can be of great help in traffic handling when used and answered properly. W4AAQ recently answered a "CQ Alabama" hoping to collect a little traffic for his state, only to have the station come back to say "QSP Texas?". Being in extra good spirits, W4AAQ took the message for Texas and sent a "CQ Texas." A "4" in Georgia answered him. These are good examples of the improper use of directional CQs. Don't send a directional CQ unless you mean it, and don't answer one unless you can efficiently handle the traffic involved.

QST FOR OCTOBER, 1930

C. O. Wyman, operator at NN7NIC, is back in the states after 28 months in Nicaragua. He is stationed at Quantico, Va., and is anxious to renew contacts with the gang from W3AWS. NN7NIC will still be on the air with Operator Stillwell at the key.

WIAY-W9FZN believes that orderly stations and clean-cut operating practise are synonymous, and go hand in hand. Surely a neat station inspires one to neat operation just as slovenly operating seems coherent with a slovenly station layout. WIAY suggests that experimenting be confined to the laboratory or other fitting place so that the station may be kept immune from slipshod apparatus, which is the first step toward careless operating.

CPIAA is the only active amateur station on the air in Bolivia. It is located at Tipuana, a gold mine city, situated about sixty miles air line from La Paz. In order to reach Tipuana one must travel for one day by auto and five days by mule, over winding roads across mountains, covering a distance of about 250 miles. We can judge from this the great pleasure and help amateur radio must be to the people of Tipuana. The owner and operator of CPIAA hails from Minneapolis, Minn., and would like a schedule in that city on 14 mc. You DX boys should watch for CPIAA and add Bolivia to your list.

On September 8 W8VS took a message for PY1AW from LDIV, located at an island north of Russia, and inside of half an hour gave the message to PY1AH. Nice work, OM!

Foreigners and operators on expeditions are always interested in the contents of the current issue of QST and like to get the dope just as promptly as anyone. On September 8 W6AM sent a complete summary of September QST (from cover to cover) to WFW Operator Mason on the Byrd Expedition. Why not follow W6AM's cue and help those at distant points to get the latest dope sooner?

An amateur station was installed and operated at the Philadelphia Electric and Radio Show, November 11 to 16, 1929, by W3PB, W3SM and W3ZF. An unusually large amount of interest was shown by those visiting the show. The booth was so crowded that it was necessary to rope it off in order to allow the operator room to operate. Reception was difficult because of the various types of man-made interference always present at radio shows. W3VQ was the official "barker" inasmuch as he stood on the table calling, "Here you are folks, something for nothing! Send your folks a message." He got the traffic — and how! The station used the call W3ZF and handled 1675 messages!

Thanks are due the Raymond Rosen Company; the Electric Club of Philadelphia; Mr. George Conover, Managing Director of the Show; the Philadelphia Electric Company and the Postal Telegraph Company for their help in the installation and maintenance of the booth.

W9ASX of South Bend, Indiana, experienced the "thrill of a radio operator's lifetime" by sending an SOS when the steamer *Senator*, on which he was operator, was sinking following a collision. Ellis, W9ASX, transmitted until the power went off and the *Senator* started on her final plunge. He then ran to the rail and jumped and was rescued.

On October 19, 1929, 3000 A. & M. students from College Station, Texas, came to Ft. Worth to see their team play T. C. U. In the two days they were in town they managed to meet and get the telephone numbers and addresses of several thousand Ft. Worth YLs. (Hi.) When they returned to College Station W5AQY arranged a schedule with W5HY to handle their Ft. Worth traffic. This started something! Every message required an answer, and in three weeks nearly 400 messages passed between W5AQY and W5HY. The operators at those stations must feel like Dan Cupid by this time. Hi.

Have you heard VE9GW? This station, located at Bowmanville, Ontario, has a new crystal-controlled radiophone transmitter operating on 6095 kc. (approximately 49.3 meters) per the following schedules: Week days, 6:45 a.m. to 10 a.m., and from 5 p.m. to midnight or later; Sundays, 11 a.m. to midnight or later. The times given are Local Standard Time. Engineers at VE9GW are desirous of receiving reports from amateurs, particularly those in western

United States and Canada, in order to check up on their range and field pattern. Your reports on reception of VE9GW's broadcasts may be mailed to A.R.R.L. Headquarters, or direct to Mr. W. A. Shane, Station Engineer VE9GW, Bowmanville, Ontario.

Operating Directive No. 1

Army-Amateur Radio System, 1930-31

EFFECTIVE Monday, September 8, 1930, the following procedure will govern the regular operation of the Army-Amateur Radio System during the active year 1930-1931.

1. Army-Amateur Net Control Station W2CXL has been moved from Fort Monmouth, New Jersey, to Washington, D. C. The Army-Amateur Net Control consists of two stations and three call letters. Station WLM and W3CXL are the same transmitter on two different frequencies, WLM being used for the 6990-ke. crystal frequency, and W3CXL being used for the 7000-7300-ke. amateur band. The frequency of the crystal used by W3CXL at present is 7136-ke.

Master Traffic Schedule, Army Amateur Radio System

Effective September 8, 1930

ALL TIME HEATED IN EASTERN STANDARD TIME

Corps Area	6:30	7:30	8:30	9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	Remarks
1	D	S	C	*S	*A							A — Army Net operation
	C	A	D		*D							C — Corps Area Net operation
2	D	S	C	*S	*A							S — State Net operation
	C	A	D		*D							D — District Net operation
3	D	S	C	*S	*A							
	C	A	D		*D							
4		D	S	*C	*S	A						
		C	A	*D		D						
5		D	S	*C	*S	A						
		C	A	*D		D						
6		D	S	*C	*S	A						
		C	A	*D		D						
7			D	*S	*C	S						
			C	*A	*D							
8			D	*S	*C	S						
			C	*A	*D							
9				*D	*S	C	A		S	D		
				*C		D	S	D				

* At 12 p.m. ZLV from W3CXL—6990 kc.
At 11 p.m. ZLV from W3CXL—6990 kc.

Station W3CXM is the station of the Army-Amateur Liaison Agent, located at Alexandria, Va., and acts as Army Net Control Station on the 3500-4000-ke. band. The crystal frequencies used at present by W3CXM are 3990 and 3950-ke.

2. The master traffic schedule will remain unchanged, except as modified by paragraph 4 below. (All time entries indicate Eastern Standard Time — not daylight saving time.)

3. From this schedule it will be seen that the Army Net Control Station has two twenty-minute schedules with the Corps Area Net Control Stations of the 1st, 2nd, 3rd, 4th, 5th, and 6th Corps Areas; one half-hour schedule with the 7th and 8th Corps Areas and one one-hour schedule with the 9th Corps Area. The Corps Area Nets, State Nets and Districts Nets operate in the various corps areas at times indicated by C, S and D for those corps areas.

During the period 1:30 to 2:30 a.m., Army-Amateur Net Control Station will stand by on 6990-ke. (WLM) for direct contact with any Army-Amateur in the United States or Porto Rico for traffic that could not be disposed of through the regular operation of the net. From 2:30 a.m. through the rest of the night Army-Net Control Station will stand by for other foreign contacts.

4. In addition, Army-Amateur Net Control Station will broadcast a message from the Chief Signal Officer direct to all Army-Amateurs each Monday night. This message will be broadcast by station W3CXM on the 3500-ke. band at 10 p.m. EST and by station WLM on 6990-ke. at 11 p.m. EST. Nets affected by this transmission will so arrange their operation that all Army-Amateurs will copy this ZLV message. Acknowledgment of receipt of this message will be made by all Army-Amateurs to their respective net control stations and the corps areas will report on their weekly

reports to the Chief Signal Officer the results obtained on reception of these messages in their respective corps areas. The text of the message will be the same for both transmissions and until further notice the actual frequency of station W3CXM will be 3950-ke. and WLM 6990-ke. Station W3CXL operates until further notice on 7136-ke.

Traffic Summaries

(JULY-AUGUST)

Pacific led by Los Angeles.....	6165
Central led by Michigan.....	2680
New England led by Eastern Massachusetts.....	2045
West Gulf led by Oklahoma.....	864
Atlantic led by Maryland-Delaware-District of Columbia.....	824
Dakota led by Southern Minnesota.....	730
Hudson led by Northern New Jersey.....	662
Northwestern led by Oregon.....	579
Southeastern led by Florida.....	487
Delta led by Mississippi.....	473
Midwest led by Missouri.....	350
Roanoke led by Virginia.....	263
Rocky Mountain led by Colorado.....	173
Quebec.....	113
Ontario.....	63
Vanalta led by British Columbia.....	13
Prairie led by Saskatchewan.....	13
478 stations originated 4341; delivered 3744; relayed 8412; total 16,497. (86.2% del.)	

Los Angeles again leads the country in traffic and continues to claim the Traffic Banner. What section will get it next month? A traffic summary showing the standing of the various Divisions for the past month is printed above. What place does yours take?

The Roberts' Cups

WON by Bruce Stone of W6AMM and by Sgt. Lino Cabiling of KA1HR. Both the cups were awarded in consideration of the reliability and unusual performance of these operators in making QSO's with the United States and in relaying traffic between the United States and the Philippine Islands. These trophies were presented by Lieut. Haydn P. Roberts and awarded under the auspices of the A.R.R.L. The award was announced at the Pacific Division Convention. Congratulations to the winners!

Among other things the contest has shown the great amount of traffic handled by several of our very best amateur stations. The total number of messages delivered by Knoch of W6BJX in 1927 and 1928, Stone of W6AMM in 1929 and KA1HR's operators for the three years constitute records that will stand in amateur radio history. The work of the three stations mentioned is something to be aimed at by all A.R.R.L. members and it should not be forgotten that every word of every one of these messages was received at a distance of about 7000 miles all year 'round and often through static and conditions that would discourage many operators.

The count of the messages Bruce Stone (W6AMM) handled with KA1HR, KA1DR, KA1RC and KA3AA during the period of the contest and after some messages handled with Philippine stations by visiting operators at W6AMM had been thrown out of the count is as follows: Originated, 1025; Delivered, 1944; Relayed, 129; Total, 3098.

Six operators at KA1HR submitted sworn affidavits in connection with the traffic handled in the contest, Sgt. Lino Cabiling, Sgt. Ramon Gallero, Corp. Mariano Dapaoen, Corp. Marcelino A. Espejo, Ex-Sgt. Alfredo Balbuena, and Master-Sgt. Angel D. Maningas, the competition being keenest between the first two operators, and the last named being the Chief Operator whose operation is confined to such times as when new equipment is on test or when the regular senior operators are sick or on pass. Cabiling and Gallero are credited with a total number of messages and QSO's as follows: Cabiling, 4590 messages (sent 2643, received 1947) and 705 QSO's; Gallero, 3779 messages (sent 2234, received 1545) and 681 QSO's.

In view of the fact that no additional entries have been made by other Philippine and U. S. mainland stations in the last two years of the competition, the Roberts' Cup Award will be discontinued for the present. Possibly at some later date if there appears to be more chance of competition, the Roberts' Cup Award will be renewed.

These stations, doing the best work, find their most substantial reward in the consistent and unselfish service they are able to render. Lt. Roberts feels certain that the good



work will continue with the same splendid success as in the past. He says, "If the awarding of these cups has in any way resulted in a little more effort to handle this traffic, I feel greatly rewarded in my attempt to continue American-Philippine communication."

BEGINNERS, ATTENTION!

We are receiving many requests for information on how to go about securing amateur radio operator's and station licenses. The January issue of *QST* contained Part 1 of the article, "Passing the Government Examinations for Operator's License." The February issue contains the second part. These articles should answer practically every question you may have on obtaining licenses. Simple receiver and transmitter descriptions were given in November and December (1929) *QST*'s respectively. Back copies of *QST* may be procured from our Circulation Department for 25 cents a copy. A list of the "volunteer stations" that are sending code practice and other information for your special benefit will appear in November *QST*. A list of stations sending code practice will be gladly sent you, if you will drop us a line. The **RADIO AMATEUR'S HANDBOOK** contains just the information you need, if you contemplate building a station. We invite requests for any information you may want. Just drop a line to the Communications Department and we shall do our best to help you.



ON THEIR TRIP THRU WISCONSIN

2JX - "SAY BILL, ONE MORNING I WOKE UP AN' WORKED AN 'QA' WITH A 199."

1IE - "G'WAN WALT, YOU MEAN FIRST YOU WORKED TH' 'QA' AN' THEN YOU WOKE UP."

DIVISIONAL REPORTS

ATLANTIC DIVISION

MARYLAND — DELAWARE — DISTRICT OF COLUMBIA — SCM, Forrest Calhoun, W3BBW — Well, fellows, the cool wx will soon be with us again. Better start now to dust the xmitter off and tighten the old antenna, for we are going after that traffic banner strong this fall and winter. Make skeds and keep them. They mean traffic. District of Columbia: W3BWT still maintains the lead, but he has a close rival in W3CXL (old W2CXL). Kimmel of W2SC fame can be heard at the key of W3CXL. W3CAB reports handling some traffic from China. W3OZ enjoyed a vacation to Canada. W3ASO reported. W3AKR reports W3NR is on the S.S. *Steel Age*. W3PM will be heard soon with an MOPA. W3CDQ attended the IRE Convention in Canada. W3APJ is a new ham in Washington. Maryland: W3AFF leads with a very small total. W3AIL is building for 1930 sigs. W3ON is awaiting a motor generator for his MOPA. W3WF is vy QRL. W3LA has a super audio amplifier and sez he can hear anything but traffic. Hi. W3AW rebuilt his outfit and started handling some tlc. W3DQ sez QRM from YL is QSA5. W3NY is experimenting with a low power portable and uses the call W3BDK. W3DG came to life again, but is still suffering from YLitis. W3AOO is having trouble with his filter. W3ARJ, W3BNC and W3BCA are new hams in Hagerstown. W3PQ needs some late skeds on 7000 kc. W3BBW is going again after a vacation since June. W2AOW and W9EOQ visited the shack of W3BBW for a short while. W3ZK is a promising station and will be ORS soon. Radio Inspector L. C. Quaintance is on the air with call W3JQ at Washington.

Traffic: W3BWT 155, W3CXL 136, W3AFF 10, W3CAB 8, W3LA 7, W3AW 6, W3DQ 6, W3OZ 2, W3ASO 2.

SOUTHERN NEW JERSEY — SCM, Bayard Allen, W3ATJ — W3ASG is the high man this month. W3ATJ raised his power from 270 volts to 750, with the result that practically everything went up in smoke. Trenton has several new stations helping with tlc — W3BAQ handled a few and says conditions are bad. W3EM is having trouble getting out on 7000 kc. W3AWV is also having trouble. W3AID is a new station in Trenton. Welcome to the section, OM. We regret to learn of the death of Mitchell of W3DH. He was a fine tlc man and certainly will be missed. We extend our sincere sympathy to his family. W3BEL of Oaklyn is our new OO station. Watch your freq, fellows. W3ZI and W3VE are going to camp at Watertown, N. Y., with the 112th Field Artillery, and will operate a portable, W3ZZB, on 3940 kc. W3AWL is on now and then. W3OH is attempting a comeback. W3PBH, W3DY, W3ASJ, and W3SM are keeping the 3500-kc. fone band densely populated at Camden. W3BVG of WMBI will soon be home on a vacation. W3UT lost two teeth and his MG. Hi. W3BUF is taking a two weeks' vacation in Canada. W3KJ is building a fone set. W3BRE, W3WW and W3ARP are pork packers this summer (that's natural for a HAM). W3WW kills rabbits with stones while W3BRE and W3ARP go with him for moral support. W3ACX is working the Atlantic City gang from Tuckerton and is trying to QRM WSC hi. W3HS is going to California. We welcome W8DJV from Cleveland, who has moved into the section, residing at Merchantville. Please keep the reports coming in on the 16th, fellows.

Traffic: W3ASG 35, W3ATJ 13, W3BAQ 4, W3EM 2, W3AWV 1.

EASTERN PENNSYLVANIA — SCM, Don Lusk, W3ZF — By the time you are reading this the wx will be better and traffic should be picking up. It is hoped that this section will go through this season with a clean record insofar as off frequency and Govt. regulations are concerned. Check up, OM, before you commence. Let's all get started now and see how much tlc we can pile up. W8EU is getting all set with a TNT xmt for fall work. Hi. W3UX is having trouble with his 281's and is shifting to 866's. W3AKB sez her tlc got drowned in the open waves on her vacation. W3GS, W3NU, W3WG and W3ZF are all showing R.C.A. Victor how to build good radios and working about 12 to 18 hours per day including Sunday. W3GS managed to handle quite a few messages considering his hours. WSCWO is playing tennis quite frequently. W8AWO calibrated his frequency meter. Better watch your frequency, fellows. W8CUD made his first report. W3FY reported too late to catch last month's report. A new man, W3BCF, makes his

bow in ham radio. Welcome, OM. W3ALE's ORS application has been received. W3AQN sent in a nice report of conditions in Canada. W3AVI makes his entrance into tlc circles and promises a steady bunch of skeds with lots of tlc. W3WG is on the air using loop modulation on fone. W3MC was away on his vacation this month. W3AUR is working on a new timing device. W3AQQ sent in his third report. W3ZF is back on 3500 kc. with Xtl perking. FB.

Traffic: W3GS 64, W3AVI 36, W3FY 27, W8EU 17, W3UX 15, W3MC 8, W3AKB 7, W8AWO 7, W3WG 7, W3AQQ 6, WSCWO 2, W3ARU 1.

WESTERN PENNSYLVANIA — SCM, R. M. Lloyd, W8CFR — Reporting was quite a bit better this month. W8GU is up in front this month. He was recently elected president of the Erie Amateur Radio Club. Congratulations, and keep up the good work! W8DKS says W8BRM is building a new station, while W8CBA has his working fine. W8DUT says the past month was exceptionally slow. W8AVY managed to get on the air and to do some work on his new crystal transmitter. W8AGO will have a crystal control transmitter on three bands during the fall and winter. W8ARC will be on the air with the arrival of the good weather. He says W8AHE, W8DGG and W8BJC are working on airplane radio. W8CUG is hoping to have a new mast up before long. W8APQ is training YL operators. W8DKJ, W8DKL, W8DKN and W8DKI received licenses at the convention. W8CNB can operate on three bands and will be on the air as much as his school work permits him. W8CEO has returned from his vacation and is back on the job. W8DLG is rebuilding. W8YA will soon be with us again. W8AJU has an AC super-het working on all bands. W8ASE has a new MO-PA set and surely seems pleased with it. W8AYH is on the 3500 and 7000-kc. bands. W8KD sends a lot of news from Erie. He expects to have a crystal transmitter shortly. He says W8BNU is trying DX on 14,000 kc., W8BVG is on when he can leave his power boats, W8AT and W8CCR are rebuilding. W8BNV visited in Philadelphia with the hams there, and W8DKL is a new ham. W8DKJ is the technical man for the Erie Amateur Radio Club, while W8DKI is the new Secretary. W8API is a newcomer in Penn., Pa., who works on 3500 kc. W8CFR will be on the air and hopes to have a nice traffic total by the time this is printed. W8BHN visited W1MK. W8AMA is on again for schedules. W8VF is handling traffic.

Traffic: W8GU 20, W8DKS 8, W8DUT 7, W8AVY 5, W8AGO 4, W8ARC 2, W8CUG 2, W8APQ 2, W8CNB 2.

WESTERN NEW YORK — SCM, John R. Blum, W8CKC — It has been so hot in most of the shacks that filament transformers are unnecessary. The tubes keep hot without them. W8AFM was on vacation. W8CYG worked some DX. W8IH and W8CKC played miniature golf most of the month. W8AWH uses the T.N.T. in push-pull. The J.A.R.A. is certainly getting active. They meet every week and have a station on the air — W8ON. All amateurs passing through their town are welcome. W8ON was at the Chautauqua County Fair. W8CHX has his new 14 meg Xtl outfit going. W8BUP was off the air for the month. W8DSP worked DAIV. W8BJO has a new Ford and is running a Y.L. taxi. W8CIL is on with a new 210. W8CEZ has a new all a.c. receiver. W8QL leads in traffic this month. W8BHK has a new xtl outfit. W8DII complains of Q.R.M. W8BCZ keeps steady skeds. W8BIF is on 3500-kc. fone. W8CNX has a complete new outfit from aerial down. W8BPJ has a new 100-watt xtl-controlled outfit. W8CRF reports a new radio club in Schenectady, N. Y. W8TZ is back home again. W8DMG is a new one this month. The Buffalo Club had their annual picnic supervised by W8AFM. Baseball, horseshoes, eats, etc., etc., were indulged in by all — a real party that only W8AFM can put on. W8DSA is a new O.R.S. W8ADZ is old W8DSA. The Buffalo gang installed and operated station W8BVI for the Boy Scout Jamboree at Buffalo. The stations within a hundred miles were worked on schedule and the Scouts kept in touch with the folks back home. Fine business, Buffalo. Traffic reports suffered this month, but after the September reports things should pick up, because it looks as though we are going to have about twenty-five O.R.S. left.

Traffic: W8QL 42, W8CEZ 5, W8CIL 5, W8CRF 9, W8BCZ 23, W8DII 58, W8BHK 7, W8TZ 3, W8BUP 4, W8AFM 2, W8CKC 4, W8DSP 26.

CENTRAL DIVISION

INDIANA — SCM George Graue, W9BKJ — The various reports are more than was expected due to the change in SCM. However, I want to hear from all the ORS next time. Your new SCM will be glad to work you, so whenever you hear W9BKJ (3500 kc. cc) will appreciate getting acquainted over the air. W9RS is trying to make a crystal work. W9AKJ has a current feed Herts that won't work. W9ENX is home again and has the key oiled trying to make up for lost time. W9AIP is making another attempt to have his set crystal controlled. W9YV-W9RW are contemplating a new and more powerful MOPA. W9GJS just got back from a two weeks' cruise with the U.S.N.R. W9CIC and W9A00 are still going big on 3750 kc. W9ALB is going big on 7200 kc. with a 216A. W9EPH will be in California for six months and hopes to work his many acquaintances from there. W9DWB is with us for the summer and wants to renew acquaintances. W9BZZ and W9EEH have yellow tickets and will operate WPDH of the Richmond Police. W9FXM has a new AC receiver under construction. W9FXO reports a fifty watt on 14 mc. The Elkhart gang have organized a club which is flourishing under the name of the Elkhart Radio Transmitting Association.

Traffic: W9GJS 6, W9AIP 21, W9AKJ 1, W9AXI 14, W9CVX 19, W9ETH 6.

KENTUCKY — SCM, J. B. Wathen, III, W9BAZ — The heat still keeps the gang away from their outfits. W9JL comes first with a fine summer total. W9AZY has added WAC to his other trophies. W9OX sticks to 3.5 kc. even during the static months. W9BAN complains that the heat interferes with his being on much. W9EYW is struggling with an AC receiver. W9FZV sold his 500-W rig and is putting in 7.5 w. CC DC. W9GGB spent August in Brooklyn. Our reliable W9CEE failed to get any traffic this month. W9BXX is still rebuilding. W9ARU is touring the West. W9DIK is home after a six months' rest cure. W9BGA remembered to report. While shooting blackbirds around home, W9BAZ shot down his antenna. Hi. We would enjoy getting reports from the many new stations in the section. Don't be bashful. Now is the time to get going for the winter work. Write to W9AZY the Route Manager and get schedules lined up.

Traffic: W9JL 112, W9AZY 18, W9OX 9, W9BAN 5, W9EYW 4, W9FZV 2, W9GGB 1.

ILLINOIS — SCM, F. J. Hinds, W9APY — Traffic and schedules seem to be picking up. Let's go, fellows, and drive traffic hard — see W9ERU for schedules as he is Route Manager of Illinois and can take care of you nicely. W9GJJ is going strong. W9BNI had three schedules a day for Camp Grant A-A traffic. W9FCW will now be found on 35- and 7-mc. bands. Hot weather held W9CKZ down a little, but traffic came thr ugh regardless. W9CUH has Xmitter trouble. W9ACU wants schedules for traffic. W9MI (Ex-W9PU) is going strong and handled the Chicago end of the Women's Air Derby to the Chicago Air Races. W9FO reports the radio at the Air Races is lined up and all ready to go. DX and traffic are improving at W9CZL. W9FUL is about ready to do a little receiver rebuilding. All traffic handled at W9BZO was from Camp Grant. W9AFN worked Martinique as his 28th country. W9BIR reports W9FST and W9FXZ as new hams in Peoria. Let's hear from them. Sorry to state W9AD has had a spell in the hospital. He is all right now. W9DZU works on 3500, 7000 and 14,000. W9FUR made a cruise on U. S. S. Wilmette! W9EGD has worked 500 stations on his 201A since February. W9LF was QSO two ships and K6 in one night with his 210 on 7000 kc. W9FHR is a new ham in Peoria. W9EAL has DC now with the addition of 4 miles. W9DCK is back on with a nice new SG receiver. W9FJD has joined Uncle Sam's Navy. We all hate to lose you, OM. W9BSH is now W5BPT and W5BPS. W9CYB uses a counterpoise under the quarter round on the office floor, but reports no smoke yet. W9BEO is thinking radio and plowing corn. W9AVE is working on crystal control. W9DAX will be on 1752 kc. (171.12 meters) with a brand-new fone about October 15th. W9BEF felt like throwing a party when he received a card from WFA. W9GKG has a pair of 201A's going with a 400 V. generator. W9CNY is working on a crystal-controlled set. All of W9ERU's traffic was Philippine except one message. W9FTU is portable call of W9FFQ. The Motor Generator at W9CFA has gone haywire. W9BXX has moved into Chicago. A new Tobe filter at W9DSS produces DC. W9BNO has a new receiver. Lightning struck the antenna at W9DBE but all is now patched up and going strong. W9DZM is

acting as engineer for the construction of WSUO, which is a 5000-Watt Station at Ottawa. This is in addition to his regular duties as manager of Crescent Canning Factory. He also is our star traffic man. FB, OM.

Traffic: W9DZM 366, W9BIR 53, W9BZO 46, W9CZL 46, W9BNI 39, W9MI 21, W9FCW 12, W9FUL 12, W9DBE 10, W9ERU 10, W9CUH 9, W9AFN 8, W9CKZ 8, W9DZU 8, W9FPN 7, W9FO 6, W9CNY 5, W9GJJ 5, W9ACU 4.

MICHIGAN — SCM, K. F. Conroy, W8DYH — Thank you, gang, for electing me as your SCM. WOW! Listen to this: Michigan's total is 1367 messages, and a lot of the gang on vacations! FBI W8MV and W8DFE raced, W8MV won. W9GJX visited W9EGF and now EGF is high-hatting every one. W8AJC is busy with off-frequency work. W8DED is RM Western Michigan again, and is getting things lined up for fall. QRN knocks W8CAT's sigs back into the antenna! W8CST ees he will furnish one tub-full un-used space to all HAMS who forget the cheapness of space when sending (?) to him. W8DDO is an active ORS. W8BTK ran up his total skedding W8DAA. W9DAA had a shortage of ops, but managed to run up quite a total. W8AJG was at the sledge-hammer there. Hi. W8DVQ is saving his pep for fall. W8CVU works tfe and dx on 7 mc. W8CSG and W8BDI put out lotsa signal with only 171a sets. W8BJT visited W2AKO, while vacationing. W8BRS, Oh! Oh! CWC convention! TSK TSK!!! W8AXM reports W8CDU, W8AUC, and W8DCN as new hams at Ann Arbor. W8DA will have a fifty in MOPA on 3.5 mc. W8SS handled all Nicaraguan tfe this time, FB. W8ACW has another YL!! W8BJ went on a fishing trip, but can't remember coming back! W8ACU hatches W8CFV, W8CJY and W8CII. W8BBX starts out strong. He is old W9GEB. W8AP is chief opr. at W8HO, and sure handles plenty. W8DEH builds and double-builds. Rotten wx ruins W9HK's skeds. W8AJL comes to life occasionally. W8EY is putting up a copper-tubing antenna. W8BWC monopolizes VK and ZL QSOs. W8BWJ piles them up on 14 and 7 mc. W8CJL is experimenting with low power and sepps, with FB results. W8WG and W8CJZ learn new words each day — it's a non-oscillating crystal! W8CLN is putting his MOPA under the microscope. W8BGY threatens W8DYH becuz of a recent QST crack. W8AUT shifts to any band in 30 seconds! Whew! W8AYO is another new ham at Owosso. The Detroit gang is organizing a radio club; any interested Brass Pounders, please write. W8DMS is struggling with CC. W8AGJ is knocking 'em dead. W8DYR gets a musical note — his rig is in an old organ! W8BFL is reporting for the Jackson gang. W8CHH handles a few, but doesn't report them. How come? W9CE manages to handle some in spite of rotten conditions. W9EQV and W8CKZ say QRU. W8DJQ wants skeds for tfe. W8ASO moved to Berkley, Mich. W8CUP comes to us from Toledo, Ohio. W8GP, ex-4MV, may handle tfe as of old. W8DOV is at Box 565, Clawson, Mich. W8DYH is having lots of visitors lately. Come on, gang, don't be bashful. Include wise-cracks, hot news and other stuff — so we can make this report more readable.

Traffic: W8BDI 13, W8AUT 28, W8BGY 19, W8DAA 66, W8CUP 5, W8DMS 30, W8DJQ 2, W8DYH 218, W8CLN 19, W8WG 11, W8CJL 9, W8BWJ 43, W8AJL 6, W9HK 49, W8DEH 23, W8HO 110, W8BBX 46, W8DFE 61, W8BJ 26, W8ACW 27, W8SS 15, W8DA 13, W8AXM 30, W8BKT 11, W8CSG 18, W8CVU 32, W8DVQ 17, W8BTK 29, W8DDO 10, W8CST 24, W8MV 67, W8CAT 36, W8DED 55, W9CE 4, W8ACB 3, W9GJX 11, W8AJC 67, W8BRS 3, W9EGF 1, W8AGJ 110.

OHIO — SCM, Harry A. Tummonds, W8BAH — W8CWA, Cleveland Wireless Assn. Inc., Club Station is now in operation on phone and CW at the Cleveland Airport. W8DBU has been appointed temporary acting Route Manager for Cleveland district. He asks that you write him for skeds. W8BHF, who also holds W9BJW reports, is now operating his new fone at Cin. W8AOJ is at Camp Perry. W8BRI reports that he changed his transmitter to breadboard style. It is reported that W8BF is marked for life. He recently reported a call having a letter W as Y for Washington. W8CNN received his application for ORS. W8DHA applies for an ORS. W8BAH is on the air regularly over W8CWA. W8DVL reports. W8CFT sorry he cannot make convention. W8BRR will attend. W8ADS says, "Too darn hot to even live." W8LI is watching for expeditions. W8CEI finally got xtal going ok on 3700 kc. W8BKM wants schedule with Cleveland on 3500 kc. W8CNO reports torrid wx. W8DDF is back at Purdue and will operate there with calls W9DDB-W9FCJ. W8BAC

reports traffic picking up. W8BGX is in Florida for the winter. W8CX made the BPL. FB, OM.

Traffic: W8CNN 18, W8CWA 13, W8DHA 12, W8CX 82, W8BAC 78, W8DDF 56, W8CNO 53, W8BKM 32, W8LI 2, W8DVL 1.

WISCONSIN — SCM, C. N. Crapo, W9VD — W9DTK has installed a new 3750-kc. Zepp antenna which is working fine. W9FSS is on a cruise with the Naval Reserves. W9BIB sent a card of greetings from the country of the VE3s. W9EBO is coming to life again and will be on again September 1st with a rebuilt transmitter and receiver. W9VD resumed operations August 20th and will be heard on 3650 and 7120 kc. from now on. W9GFL takes all honors this month in traffic handling, and is doing good work as Official Broadcast Station for the northeastern part of Wisconsin. The Green Bay boys are organizing a ham gathering. They include W9ART, W9FMQ, W9FIN, W9AGY and W9GFL.

Traffic: W9DTK 4, W9VD 4, W9GFL 63.

DAKOTA DIVISION

SOUTH DAKOTA — SCM, Howard Cashman, W9DNS — W9DB reports heavy tennis QRM. He calls attention to Army skeds starting September 1. W9FOQ's 210 went West. W9DKL is trying to electrify a near-by railroad with his 210. W9EUH is back in Yankton. Let's hear from you, OM. W9DNS still breathes.

Traffic: W9DNS 16, W9DB 6.

NORTHERN MINNESOTA — SCM, C. L. Jabs, W9BVH — The extreme heat and drouth seems to have had an effect not only on the crops but on traffic and activity in this section as well. The SCM is on a traffic route from the Philippines, China and Guam. W9ARE is building a push-pull receiver. He has portable call, W9BFQ, and plans to use it for experimenting on magnetic deflection of RF current. W9DOQ is moving back to Duluth. W9EHI reports conditions poor all month. W9CTW, the Route Manager, expects to be on for the season soon. Write him for schedules. W9GKM is at a Scout Camp. W9DJW is on 7- and 14-mc. crystal-controlled. W9EGU is going to build a new frequency doubler and use 210s and a couple of 852s for push-pull outfit stage. Beginning with this report, all ORS who fail to report as required in the Rules and Regulations will be taken off the list without further notice.

Traffic: W9BVH 51, W9ARE 18, W9DOQ 8, W9EHI 1.

NORTH DAKOTA — SCM, Guy L. Ottinger, W9BVF — It seems as though the whole North Dakota section is rebuilding, getting ready for a hard winter. W9DGS reports rebuilding both receiver and transmitter. We have two new ORS this month, W9DHQ and W9GIH. Our Prof. at W9IK is going to be teaching in Minnesota this next school term and will be unable to be called a N. Dak. man for at least nine months. Sorry to see you go, OM. W9DFG and W9GIH are both new U.S.N.R. men. Our OBS, W9DFG, has arranged a new broadcast sked which will appear in the next QST. The SCM has rebuilt the pile and handled a little traffic. Our other Prof., W9DM, is going to be on the air again very soon.

Traffic: W9BVF 34.

SOUTHERN MINNESOTA — SCM, J. C. Pehoushek, W9EFK — W9AQH, Ted Young, handled a large amount of traffic, mostly from the Philippines and China. W9DRG wkd a lot of dx this month. He reports W9FTE, a new ham at Owatonna. W9COS makes the BPL on deliveries. W9DSH has been on a little this month. He and W9CPM are planning a Super-Ham Station. W9BN has a new set on 14 mc. feeding an antenna seven floors above the xmitter. W9GHO traded his xmitter for a model T Ford. W9AKN, a new ORS, says the hot wx kills his ambition. W9AIR is on cruise. W9ABV visited and attended a blowout by W9BKX when the Byrd pictures came to town. W9BXE is moving to a new barracks, so will not be active till fall. Red sez they are short of men, and once when W9ABK was going off duty he met himself coming on. Hi. W9FLE lost his antenna in a storm. He reports a new amateur at Wood Lake, W9EEB. W9DGE has had a hot time on the barges this season. His new QRA is 2946 Cleveland St., N. E., Minneapolis. W9EYL thinks 14-mc. conditions are improving. W9EFK and W9EOH spent their vacation at Cy Barker's lake cottage and had a dandy time. W9DH and W9BYA are on fm W9BN once in a while. Conditions seem to be improving, and fellows are rebuilding, so it looks as though So. Minn. is in for a bang-up winter.

Traffic: W9AQH 229, W9DRG 179, W9COS 116, W9DSH 50, W9BN 18, W9GHO 2, W9AKN 1, W9AIR 1.

DELTA DIVISION

TENNESSEE — SCM, James B. Witt, W4SP — Reports are a great deal better this month. Several are rebuilding and getting ready for cooler weather. We will lose W4VK soon, as he is going away to school this fall. W4OW is putting in Xtal. W4KH is also putting in Xtal and bunch of electrolytic con. W4AFM had a ham gathering at his home of all the hams in upper East Tennessee and reports FB results. He is getting things going around Bristol. He also broadcasts code practice for beginners on 7100 kc. at 8 p.m. E.S.T., Monday, Wednesday and Friday nights. W4AFS reports AA net working FB. The SCM would like to hear from all ORS stations who have not sent in a report the last two months.

Traffic: W4CW 36, W4VK 31, W4AGW 24, W4RP 20, W4KH 20, W4AFM 18, W4AAD 16, W4FX 3, W4AFS 20.

ARKANSAS — SCM, Henry E. Velte, W5ABI — Well gang, DX weather will soon be here and I am sure that all of us will be glad of it. W5AZA at Magnolia is getting out with a xtal-controlled transmitter. W5BDB is building a power pack to feed his 852. W5AQN is a new station at Okey. Welcome, OM. W5AQX has been bothered with signals fading. W5ACM has moved to Ft. Smith and will be heard from there soon. He is still operating at K F P W. W5HN is on 7000 kc. W5IQ is working on a super-het receiver. W5BBI continues to get out well with a 210. W5ABI has just returned from his vacation. Well, fellows, let's hear from you all next month.

Traffic: W5ABI 23, W5AZA 20, W5AQX 12, W5BDB 8, W5BBI 1.

MISSISSIPPI — SCM, J. W. Gullett, W5AKP — W5ANP is operator and engineer at WGCM now. He wants an ORS certificate and schedules in the 7000-kc. band. W5BOT, who is located in Jackson, has applied for an ORS certificate. He has a portable call — W5MC. W5BBX is now located in Jackson. W5APP of Laurel is having trouble getting a push-pull transmitter going using TGTP circuit. W5BMA has moved to Denver, Colorado so we have lost a good experimenter. W5BNW is a new amateur located in Jackson. He and W5BHL carried a portable transmitter and receiver to camp Kickapoo and worked six U. S. and one Canadian district with it. W5AOM is still operating in the 14,000-kc. band. Ex-W9EDK is now located in Vicksburg and has applied for a fifth district license. W5AZV wants schedule on 3500-kc. band for Army-Amateur traffic. W5ANI is a new station located in Jackson. Welcome to our midat, OM. W5BNX complains that he can't get out with his transmitter at night. W5BEV says his ambition is to put out a better signal than either WLR or W5ZK. W5AED says that he blew up all condensers, plate transformer, tube, filament voltmeter and rectifier so his station is quiet. W5AWP says he works plenty of DX with his phone and has also worked CT1AA on 14 mc. W5AAP has plenty of trouble with B batteries and is off the air on this account. W5AKP is now using a B eliminator on his short-wave receiver instead of B batteries, and says it works FB. The Jackson Amateur Radio Association is now three months old and going strong. W5ASB is the call of the club station.

Traffic: W5AWP 69, W5AED 32, W5AZV 12, W5AAP 25, W5AKP 53, W5BHL 4.

LOUISIANA — SCM, Frank Watts, Jr., W5WF — The hot weather down here in Dixie has taken its toll. A very small amount of traffic hits the docket this month. W5MH was qso wld CX-7 in Uruguay on 7250 kc. FB, RL. W5BJA sez you won't hear his qrm at 3 a.m. much longer as he will soon make the YL an OW. Who's the unlucky one? W5ANA is now back and raring to go. Here's one from W5BHV. He sez he has now rebuilt and has his outfit perking fb again. W5AKW is qrt. W5WF, and W5BKL of Shreveport will be back by the time the good old days are with us again.

Traffic: W5BHV 14, W5BJA 12.

HUDSON DIVISION

EASTERN NEW YORK — SCM, H. J. Rosenthal, W2QU — With two large amateur clubs running full blast in this section, the coming winter promises lots of activity in spite of the falling off during the summer. The Schenectady Radio Amateur Club has nearly 100 members now. The Pioneer Radio Club of Westchester is making wonderful progress and is having one or two prominent speakers at each meeting. There is a quarter kw. transmitter on the air and the club call W2ANS is becoming widely known. W2LU is still battling out a nice traffic total. W2ACD is now an ORS and OBS and starts out with a lot of

traffic. W2BSH is keeping a daily schedule with W8DSS. W2QN wants to know what could be worse than saying in his report that he is rebuilding and hasn't a single sked at present. W2BJA is doing good work in getting some new hams up to their ten words per minute. W2ACY says the drought caused very poor conditions on 14 mc. so he is on 7 mc. now. W2ACB got a lucky break when W3AMP dropped into his shack just in time to help put up his new mast. W2BKN has a new TPTG transmitter all wired with silver-plated copper tubing. W2UO is still on vacation.

Traffic: W2QU 85, W2LU 44, W2ACD 36, W2BSH 12, W2QN 8, W2BJA 4.

NEW YORK CITY AND LONG ISLAND — SCM, V. T. Kenney, W2BGO — To start things going two cancellations are being made this month. More will be made as long as the gang cannot find time to report every month. The season for traffic handling is with us again and we can hope for a better total than those of the past few months. We must have more ORS, so send your applications along. **Manhattan:** W2BNL-W2ZZH leads his boro in traffic: W2ZZH has been with Ed through the 1st, 2nd, and 3rd Districts. W2BXW has been on 3500 kc. phone and is moving traffic on 7000 kc. W2BDJ, OO and ORS, finds fewer off frequency stations lately. W2CFX, a prospective ORS, is getting ready for traffic work. **Bronx:** W2AXG sends in his first report and leads this boro for the month. W2CYX is still visiting conventions while the 2nd op moves traffic. W2VG has rebuilt and is now operating on both 7000 and 3500 kc. W2AQQ is on again after rebuilding and is now using a 50-watt outfit instead of the old Type '10 tube. W2AII is expecting to join the Army-Amateur Net. W2APV skeds CM8ST regularly as well as the old reliable NJ2PA. **Brooklyn:** W2ARQ leads the section with his total. W2APK has three ops on the job. W2BEV QSO'd 80MB recently. W2BIV is a USNR man now. W2PFP reports that W2UD has a 10-watt outfit perking in Peru under the call of OA4W and is looking for U. S. contacts. W2BDU is a new op and is anxious to QSO all ops who were at Ft. Monmouth this year. **Long Island:** W2AVP is public address op at WNYC and credits W2AJP with making the traffic total this month at his shack. W2AIQ-W2AFP, OO finds many off-frequency stations.

Traffic: **Manhattan** — W2BNL 27, W2BXW 24, W2BDJ 6, W2CFX 4. **Bronx** — W2AXG 29, W2BGO 27, W2CYX 8. **Brooklyn** — W2ARQ 45, W2APK 7, W2BEV 6, W2BIV 5, W2PFP 8. **Long Island** — W2AVP 26.

NORTHERN NEW JERSEY — SMC, A. G. Wester, Jr., W2WR — W2JF, our RM, is very active and asks for better cooperation of ORS in answering his letters. Vacation time is past, so now is the time to dig up these skeds and get in the BPL. W2AOS expects his Army and Navy skeds to get going soon and hopes to make the BPL. W2AGX has an xmitter for each band. W2BPY is another ORS with an xmitter for each band. W2BDF is doing all his traffic work with his emergency xmitter. W2CJX is overhauling. Another YL station in Jersey has the call W2CMK. W2BY is leaving the ranks for college. W2BHW has applied for an ORS. W2CDQ sent his report in while vacationing at VE2BB. W2ZC handled a fine slice of traffic. W2BJZ contacted with Hawaii. W2WR is busy on several xmitters for traffic work.

Traffic: W2JF 42, W2AOS 2, W2AGX 3, W2BPY 7, W2BDF 1, W2CJX 8, W2BHW 9, W2CDQ 6, W2ZC 172, W2BJZ 1.

MIDWEST DIVISION

NEBRASKA — SCM, S. C. Wallace, W9FAM — W9DFR is just back from a cruise. W9FAM is busy getting lined up for tlc this season. W9BEX says tlc very light. W9EEW reports going on vacation. W9BBS is looking for a sked in any direction. W9DTH is in Natl. Guard training this month. W9BOQ is still busy with farm work and wants west sked this winter. W9BHN reports weather conditions bad. W9DVR will be with the gang soon. W9EHW wants some skeds.

Traffic: W9DFR 8, W9FAM 6, W9BEX 5, W9EEW 2, W9BBS 2, W9EHW 3.

IOWA — SCM, H. W. Kerr, W9DZW — The "heat" has been on and tlc sizzled to almost zero. However, response to cards sent to the gang indicates increased activity for the coming season. W9CKQ heads the list with 44 and notes his 440th QSO with VK5HG, handling tlc between the Dept. Terrestrial Magnetism, Carnegie Institute, Washington, D. C., and VK6MO. FB, OM. W9FZO has a new GE wave-meter. W9EHX reports tlc and is tuning up an xtl MOPA.

Tnx, W9EFU. A report, even if it's only one, is appreciated. W9ACL sez "All quiet on the Eastern front!! W9DNZ will be back soon. W9FFD is tuning up xtl MOPA. W9GDG is constructing a Dynatron meter for use as 00. W9DTA on with xtl MOPA. W9ACA is on 3500-kc. to get out or "bust." Western Union College stn W9EOP plans new 250 w xtl rig on 3.5, 7 and 14 mc. W9GFB wants a club at Des Moines to "make the TSARC look like a ladies' sewing circle!! W9DDX schools at I. S. C. W9GCP goes to I. S. C. (Iowa State College). W9CKD goes to Valp. W9DPL is at Valp. W9ARG is on 14 mc. W9BIP sez no luck on 28 mc. W9BIP, W9CWQ and W9FFD made personal calls at W9DZW. W9BPG is a Vitaphone op. W9DRI is building new recr. W9EHR-W9AG reports the W9AG rig qra Ottumwa ready for QSP. W9DXP moved to Chgo. W9WJ is leaving for Chgo. Drop the RM, W9EJQ, a line about skeds and Let's Go!

Traffic: W9CKQ 44, W9DZW 24, W9FZO 5, W9EHX 2, W9ACL 3, W9EFU 1, W9EJQ 4.

MISSOURI — SCM, L. B. Laizure, W9RR — W9FTA led in traffic in St. Louis, with W9AMR and W9ECI closely tied for second and third place. W9PW was fourth. W9DUD reports he landed a job at the new police radio station appropriately assigned KGPC for call. W9FTA and W9BMU sent announcements of the coming St. Louis Convention. W9ECI joined the U. S. N. R. W9FNU passed the exam and landed his commercial ticket. W9GHG reported. W9PW says radio room too hot for comfort. W9DYJ kicked in a report of traffic handled with WDDE off Labrador coast. W9DUD found time to ham a bit at home after pounding the mike at KGPC daytimes. W9BJA again led the state in number of messages. W9DHN goes to college this fall. W9EPX is making skeds for fall and winter with three now working. W9CDU kept regular sked with W9FWL, portable rig at N. G. camp out at Camp Clark. W9ENF sends in six reports on one card: W9FEQ and W9EUB are still QRL with jobs; W9ASV is back on with new stuff; W9CLQ is getting owt well with new rig; W9BZM moved to Wichita; W9ENF tried 10 mc.; W9CFL just returned from U. S. N. R. cruise. W9AKZ is out to line up a traffic chain. W9DQN is on again for traffic. W9RR has been on a few times around 2 a.m. looking for 3.5 mc. stations. The SCM again renews the seasonal call for new stations and old to unite in reporting traffic and news on the 16th of each month.

Traffic: W9BJA 46, W9FTA 44, W9CDU 25, W9AMR 24, W9ECI 23, W9PW 12, W9EPX 10, W9DYJ 9, W9ENF 6, W9DUD 9, W9RR 4, W9AKZ 2, W9GHG 1.

KANSAS — SCM, J. H. Amis, W9CET — Good radio weather is due so let's all get busy and roll up a good big traffic score for the coming season. The ORS who are failing to report may expect to lose their appointments as we have no room for dead material. W9FLG is somewhere in Texas on his vacation. W9CET has been at Fort Riley for the annual camp. W9HL reports. W9GHI is on 7000 with a 203A. W9ESL mourns the loss of a tower and a plate transformer. W9FNU has a new mast up. W9DEB has moved. W9BGL has increased his power to a UV211. W9EVT has moved here from the Nebraska section. Welcome, OM. Bed-time stories are taking W9BHR's time. Any station desiring an ORS appointment is urged to get in touch with the SCM.

Traffic: W9FLG 11, W9HL 11, W9GHI 4.

NEW ENGLAND DIVISION

NEW HAMPSHIRE — SCM, V. W. Hodge, W1ATJ — A bunch of new stations have started operating this month. W1BDN has just completed an m.o.p.a. for all bands, and wants reports on his sigs. W1BII has been working a 210 with fine results. W1NZ of Keene reports losing 3 square inches of skin putting up his new antenna. Hi. W1BJF is keeping skeds and wants more. W1BFT says the new electrolytic condensers are FB and are responsible for his d.e. note. He uses a 6 ft. antenna on 14 mc. with good results. W1BRT and W1BCP are new hams in Dover. W1AEF says his portable using 201-A worked fine at camp. W1AUY reports QRN bad, but lots of visiting hams. W1APK is handling traffic for the Rumford Press. W1IP sent in a fine report and sez he acted as relay between W1VM, Camp Devens, and W1BE, Augusta, FB. W1MB of Charlestown is digging out his junk and will be back on the air soon. W1CCM has moved to Grafton. W1BAC has been at the CMTC at Ft. McKinley, Maine.

Traffic: W1IP 186, W1APK 51, W1BFT 25, W1BAC 3, W1AEF 2, W1BJF 22.

RHODE ISLAND — SCM, C. N. Kraus, W1BCR — W1MO reports conditions poor on 14 mc. W1BCR is still

busy with tennis. WIGV reports WX conditions poor. Radio Club of Rhode Island will begin new fall program September 1st. WIAWE is busy with BCL sets.

Traffic: WIMO 8, WIBCR 5, WIGV 12.

MAINE—SCM, G. C. Brown, WIAQL—Several members of the Queen City Club recently spent a very interesting afternoon aboard the S.S. *Brandanger*, from Norway. Operator Jess Tillier was very much interested in the activities of the boys in the States. Mr. Tillier is one of the old school who had a station on the air before licenses were in vogue in Norway. WIJF, formerly WIBEAL, informs us that he received junior op recently. Congrats, John. WICDB has recently taken unto himself a wife. 73 from the gang, Louis. WIVM sends in his first report and is high man. FB, John. WIBIG is second and reports FB schedule with WIIP for traffic for Camp Devens. WIAHY says he has been on a vacation to Cape Cod. WIANH reports WIAEK, an old-timer, is getting started on 7000 kc. FB, Ed. WIGH recently spent a very pleasant week at Pine Point. WIBLI and WIAPU have applied for their Official Relay Station papers. FB. We sure need more good traffic stations. WIBFZ, Radio Serg. National Guard, recently returned from a two weeks' training at Camp Devens. Lt. Harry Crowley, WIAPH, recently qualified at the State shooting meet, at Auburn, and will go to Camp Perry, Ohio, in September. WIAUR reports a new station in Livermore Falls, under the call WIALO. WICBV is working in Oakfield prior to the opening of the college year at Maine. WICNP is spending his vacation in Vermont, and reports the Maine gang coming in FB on his high-frequency receiver. Lt. Commander W. J. Lee, U.S.N.R., and Director Fred Best recently visited the Queen City Club Headquarters and were favorably impressed with the room which houses WIACR. The convention at Portland was a marked success. Practically all of the active Maine boys and a good number from out of state were present. Everyone reports a good time. Next year's convention will be at Auburn.

Traffic: WIVM 201, WIBIG 98, WIAQD 23, WIAPU 17, WIBLI 15, WIAUR 10, WIANH 5.

WESTERN MASSACHUSETTS—SCM, L. R. Pelouquin, WIVJ—Traffic activities have picked up considerably this month and every indication is that Western Massachusetts is on its way to the busiest season ever. The SCM wishes to thank the gang for the many letters of congratulations and he hopes to continue to enjoy the spirit of good fellowship that exists between this office and every member of the A.R.R.L. in this section. The Springfield Radio Association sent in a fine report this month, as follows: Activities at the club are on the slump this month, due to hot WX and vacations, but a few of the members show up each week. Local hams have all foreseen c.w. for phone, and there are some eight or nine low power phones on the air that sound unusually good considering the power they use. Mel. Hill, WIAIF is QSA 5 R9 using a lone 210 with 135 volts on the plate. Ed. Fisk, WIADV, also using a 210 with only 100 volts, is noted for his fine modulation and volume. WIBVR is back down on 7 mc. with d.c. WIDR has improved his note to a good d.c. WICHC is off the air until he can come on with good d.c. à la 1931. WIBSJ is on with a m.o.p.a., on 3.5 mc. and a Hartley on 7 mc., as is WIBWY, who can be heard every Wednesday night 7 to 8 p.m. and from 10:30 on. WIATK is building a xtal outfit, power unknown. WIASY is still chirping on 3.5 mc. WIHS is off the air due to a new operator (Junior YL), and work at WBZ-WIXAZ. WIREG is still trying to build a good phone outfit, but is always undecided as to what to build. WIAFU is rebuilding his Xmitter, and claims he is not on much on account of the heat. WIWP and WIAWW haven't been heard lately. Guess the fish must be biting. Hi. WIMI hasn't been heard on lately. How cum, Kink, the heat? WIPY is back on again with a nice xtal note. WIBSN is on with a new portable transmitter and receiver using phone and c.w. in the 3.5-mc. band, and has had exceptional results using 2-210s with 225 volts on the plates. WIBSN has been QSO Russia and several foreign countries. Springfield now boasts three portable transmitters—WIOF, WIWP and WIBSN. The Springfield Radio Association holds meetings every Wednesday evening at the rear of 76 Cortland St., and cordially invites all amateurs and others interested to attend their meetings. What are the amateurs in Holyoke and Chicopee doing? Springfield wishes to hear you on the air. C. J. Green, WIASU, would like to hear from all amateurs in Western Massachusetts who are interested in Naval Reserve Communication work. Larry is working hard trying to organize his forces. Come on, boys, the Navy needs you. WIBSJ

wants a schedule with some live first district station for Saturday nites. WIAWW just got back from a camping-fishing trip. He took along his portable WIOF. WIBZ keeps schedules four nites a week. FB, OB, keep up the good work. WIANI is working for W.E. in Providence, so is off the air for the present. WIBVR was QSO Brasil on 14 mc. and is keeping schedules with WIBU, WIABG and WIADP. WIASY is doing some fine traffic and DX work. He will soon be an ORS. WIBNL is still waiting for the "S" tube he ordered last month. WIAPL reports as follows—Very quiet here at present, building a new receiver, plenty of hams on phone here, what a racket, Hi-Hi. Doc Tessmer, WIUM, has replaced the 2S1 that went West a short while ago. Now he is dividing his time between golf and radio. The same goes for WIAQM. Applications for ORS certificates are still in order in this section. If you are interested, communicate with the SCM. WIUM and WIASU reported by phone on the night of the 15th.

Traffic: WIAPL 6, WIBSJ 4, WIASY 14, WIBVR 6, WIBZ 21, WIVJ 10.

CONNECTICUT—Acting SCM, E. L. Battey, WIUE—In the absence of your SCM on vacation, this report is being compiled by WIUE. Traffic fell off quite a bit this month—due probably to the good weather for outdoor activities. WIMK leads with a rather low total of 326. WIAFB reported by phone. WIATW has a 204-A in t.p.t.g. circuit with gobs of condensers and chokes in order to get a d.c. note. WIBOD has been busy with his job of playground instructor. WIAMQ reports that WIAFK has moved to Brooklyn. WIADW passed the 2nd grade commercial exam and may go to sea. WIASD is helping WIBKH, a newcomer, get on the air. He will again operate his portable, WIJN, at Yale this season. WIAMG was on for CTNITE and worked WIVB and WIBWM. WITD was also on but couldn't hear a single "one." He reports that WIGB, the station of the Twin City Radio Club, will be on soon with two 50-watters. WIAGT is a new station in West Haven. WIAVS at Wallingford sends in his first report, and says there are two other new hams in his boro—WIAWZ and WIANR. Thanks, OM, and welcome to the ranks. WICRG is building an m.o.p.a. phone outfit. WICER is QRL YLs. Tek Tek. WICRK has been at the shore for the summer. WIBBU reports that he and WIHD have taken up model airplane building. WIAOX and WIAVK have returned from an auto trip through Canada, New Hampshire and New York, during which they visited WIIO, WIQK, WIACD, WIBLH, WIAUY, WICDT, WSIV and W8DBQ. WIAOX expects to start code broadcasts for beginners about October 1st. FB, OM. WIGH left his remote control switch on for 30 hours and burnt out power supply and relays. WICTI urges every ORS to make use of WIAVX's Standard Frequency and QRG Service. The fellows at Round Hill are putting in a lot of time, and we should help them by using their excellent transmissions. WIUE reports a fine vacation trip with WILQ through Maine, New Hampshire, Vermont and Canada. WIBWM and WICTI attended a meeting of 26 hams at the Bridgeport Y.M.C.A. on the evening of August 13th. A radio club is in the making in that city, with WIAKI as the instigator of the idea. WIBM displays a couple of medals he won in a sharp-shooting contest. WIBHM is building new transmitter. WIBWM is still active in Boy Scout work. WIVB attended the Maine Convention at Portland. Remember CTNITE, fellows. It is an ideal chance to meet your fellow Connecticut hams. Plans have been concluded for a "Message Delivery Contest" between Eastern Massachusetts and Connecticut. Every station in this section is urged to take part and report totals monthly to SCM Ells. Full particulars on the contest are given after the New England Division reports in this issue of QST. Let's go, gang!

Traffic: WIMK 326, WIAFB 77, WIATW 57, WIAMG 23, WIAMQ 18, WICTI 15, WIBBU 3, WIGHQ 15, WIASD 4, WIAVS 1.

EASTERN MASSACHUSETTS—SCM, Miles W. Weeks, WIVY—WIABG and WICCP are now ORS. WICRA celebrates his return after his summer absence by leading the list of traffic handlers and making the BPL. WICMZ has been handicapped on his traffic by the arrival of a second junior op. Congrats and hope you will be fully recovered by next month, OM. WIBZQ is rebuilding his receiver for ac. WIAWS and WIACA report that they have been on vacation. WIAAT is building a 150-watt push-pull set. WICQN is getting ready for the traffic contest. WIBCF has moved to Detroit. WIIG has been operating G19 with the First Corps Cadets and expects to operate at WIKN

this fall. WILQ has returned from a vacation trip through New Hampshire, Vermont, Maine and Canada with W1UE. WIBXB continues his consistent work on 3750 kc. W1WU is just completing his new outfit. Our DXer, W1AZE, reports his Xtal is getting out even better than his former RAC note. W1KH is keeping skeds with V08AE and W8CNO as usual. W1WV visited W1CCZ, W1CMZ and W1AXV while on vacation. W1BBT is RM2C on the U.S.S. *Eagle No. 10* until October. W1ABG is arranging plenty of skeds, and the traffic leaders had better look to their laurels. W1AFP starts reporting. W1ADK is about ready for his ORS appointment. The E.M.A.R.A. will have a booth at the Boston Radio Show, September 29-October 4, and will be on the air from there under W1ACH's call. The committee in charge will be W1ACH, W1BXB, W1JY, W1BUO, W1KY, W1KH and W1WV. It is expected the usual large amount of traffic will be handled. Listen for W1ACH on the 7000-kc. band during the day and on 3800 kc. at night. Beginning October 15th and lasting for twelve months, there will be a "Message Delivery Contest" between Connecticut and Eastern Massachusetts. Full details of this contest are to be found in this issue after the New England Division reports. All stations in this section, whether ORS or not, are urged to report their traffic to the SCM for this contest. If all hands show the necessary cooperation it is expected that Eastern Massachusetts will be a consistent Division traffic leader.

Traffic: W1CRA 176, W1CMZ 146, W1BXB 85, W1KH 56, W1ASI 50, W1ACH 48, W1BZQ 42, W1ABG 39, W1WV 31, W1CCP 26, W1AAT 25, W1AZE 19, W1CQN 11, W1AFP 6, W1ADK 2.

EASTERN MASSACHUSETTS-CONNECTICUT MESSAGE DELIVERY CONTEST

The SCMs of Connecticut and Eastern Massachusetts have recently completed plans for a Message Delivery Contest between their respective sections. The following rules have been drawn up as satisfactory to both sections. Every contestant is urged to read them carefully. DURATION — From midnight, October 15, 1930, to midnight, October 15, 1931. ELIGIBLE TO ENTER — Any amateur station in Eastern Massachusetts and Connecticut, with the exception of W1MK. W1MK is being ruled out because being the Headquarters station and having an operator on watch regularly it would really have quite an advantage over other participants in a contest such as this.

PRIZES

1. For the station making the greatest number of *bona-fide* message deliveries during the twelve months: A Telechron Electric Clock.
2. For the station making the greatest number of *bona-fide* message deliveries during the same period: One year's membership to A.R.R.L. Or, if already a member, an extension of one year to present membership. This includes the subscription to QST.
3. For the station making the greatest number of *bona-fide* message deliveries each month: A copy of the latest edition of the A.R.R.L. Handbook.

CONDITIONS

1. No station shall be eligible for more than one monthly prize.
2. In case of a tie, the total amount of traffic handled shall determine the winner.
3. The usual copies of all messages handled must be kept on file subject to inspection by the SCM.
4. Formal entry not required. Any station eligible need only report its monthly traffic to the SCM in the usual way, except that reports received by the SCM later than the 19th of each month will not be counted for the monthly or annual total.
5. Any unfair practices such as the use of rubber stamp messages or exchanges of messages between two stations while QSO where the messages are addressed to each other, solely to pad delivery totals, shall result in disqualification of the stations involved.
6. Participating stations must conform strictly to the Rules and Regulations of the Communications Department of the A.R.R.L.

NORTHWESTERN DIVISION

MONTANA — SCM, O. W. Viers, W7AAT — It is with deep regret that we must record the passing of Mrs. C. F. Wilson (W7AAW) of Bonner on July 17th. We extend our heart-felt sympathy to Mr. Wilson.

W7AMK, a new station in Havre, reported on time. Why can't the ORS of this section do the same? We must have more reports from now on, gang, or our section will lose its place in this department.

Traffic: W7AAW 29.

IDAHO — SCM, James L. Young, W7ACN (Reported by Oscar E. Johnson, W7AKZ) — W7AIW is having very good luck with his 3.5 mc. and finds some traffic up there. W7AHG is on the air with a 210. W7ACD is thinking of broadcasting code practice, and a request is made that all interested in the lessons get in touch with him. W7CG is at Cambridge, Idaho, using his portable, W7AMH. W7AIS is working now and then with a 210. W7ALY is busy on 7 mc. and plans another rig for 3.5 mc. W7GL is busy with the A-A. net and asks all interested to communicate with him. W7AJQ is working on 14 mc. W7UM has moved to Kent, Wash. W7AOT is burning up the ether on 3.5 mc. W7ACP has a new 15-watt rig and will soon have a new 60-foot mast. W7AKZ has a 50-watt on 7 mc. now and is planning a xtal job. W7AT is fighting his Mesny with a bit of luck. W7AFN is building at Sandpoint and will be on soon. W7AR has moved to Colfax, Wash., and promises to erect an xmitter there.

Traffic: W7ACD 12, W7ALW 8, W7AKZ 4, W7AJQ 4.

WASHINGTON — SCM, Eugene A. Piety, W7ACS — W7KZ reports for the first time and wants an ORS. W7BB comes back and leads the section. W7TX is busy with Alaskan skeds. W7AIT keeps the Capitol City on the map. W7AAX handled a message in Polish and got a good relay out of it. W7BR is rebuilding at a new location. W7TK has been handling a trick at the Naval Reserve control station in Seattle. W7ACY visited the SCM and brought his traffic along. W7VC is very busy but finds time to make a few QSOs. W7AG gets his total from the Alaskans. W7QF says that the wx is rotten for radio. W7RT is finding more time for radio now. W7AJD reports from the Lighthouse ship he is stationed on and will be on the air in September. W7AAE took a portable to Hooda Canal and got the 1st and 2nd districts stations r7, but no 7s. W7KT is on in the mornings occasionally. Good weather is coming on now so let's get some skeds and have a good bunch of traffic next month.

Traffic: W7BB 44, W7TX 41, W7AIT 30, W7AAE 28, W7AG 23, W7KZ 22, W7ACY 20, W7QF 19, W7KT 12, W7RT 9, W7TK 5, W7AAX 2, W7VC 2, W7ACS 2.

OREGON — SCM, W. S. Claypool, W7UN — W7ALM makes BPL with deliveries and reports Alaskan tlc about thru for this year. W7AJX and W7AHJ, his OW, were visited by W6RJ during month. W7AMF holds two nice skeds on 3500 kc. W7SY is proud to be the father of a junior operator. W7QY is going to attend the Spokane Convention. W7WL reports conditions favorable on 3500 kc. W7AMQ is still building. W7AIG has a YL opr on the string. W7PE has been away from his shack so long he can't remember where the traffic hook was placed. W7IF and W7EO both report no tlc. W7GE is a new ham at McMinnville. W7AHX reports a lot of news from the Eugene gang. W7RA is in Frisco. W7UJ ops KORE. W7AHZ of Creswell is getting back on the air. W7WB was heard in New Zealand twice on 3500 kc. but Roberts is at sea with Coast Guard and hasn't a xmitter going at all. The pirate can have cards by addressing SCM. HI. W7PV and W7AHA are going to convention. All ORS and other reporting stations please send future reports to Route 11, Box 247, Milwaukie, Oregon, the SCM's new QRA. Let's all try to shift for more traffic.

Traffic: W7ALM 103, W7AJX 30, W7AMF 30, W7SY 28, W7AHX 30, W7AHJ 18, W7QY 14, W7WL 5, W7AMQ 2, W7AIG 2, W7PE 1.

PACIFIC DIVISION

SANTA CLARA VALLEY — SCM, F. J. Quement, W6NX — Amateur activity dropped to an alarming low level this month, probably due to the season of the year. Let's perk up and produce a 100% report. All traffic handling stations of the section are invited to place their application for ORS with the SCM. The old reliable, W6ALW, continued his traffic handling, having increased his power to 50 watts again. W6BMW interested two friends in becoming amateurs. FB. The SCM visited the Santa Cruz Amateur Radio Club during July and found a very active group of amateurs there. The president of the SCARA, W6DCP, has applied for affiliation with the A.R.R.L. W6JU is no more. Hereafter, W6YU will be the station of the San Mateo

Junior College. W6AME sent in an interesting letter on amateur activity in Modesto. W6QA is busy grinding quartz for the rest of the Modesto amateurs. From Salinas, W6CLV reports activity on the increase. The SCM is Commanding Officer of the U. S. N. R. and any amateurs in Santa Clara, Santa Cruz, Monterey, San Benito and San Luis Obispo counties interested in the Reserves should get in touch with W6NX.

Traffic: W6ALW 46, W6BMW 24, W6DCP 19, W6YU 1.

HAWAII — SCM, L. A. Walworth, K6CIB — Our gang is happy over getting second place for two consecutive months in traffic totals. Our June total was 2665 and we almost prayed that Los Angeles would fall down so we could get first place. Everett Trout, W6FJ of Los Angeles has been a real friend to Hawaii in sending us material for our convention preparations. K6EWB's gang got two ambitious and was sent to the Army Hospital to take three months of rest cure. K6AJA wrote he is bringing Mrs. AJA to the convention. K6CIB has an a.c. Super Wasp now and will soon match it with an 852 in TPTG circuit as per June QST. On July 10th Hawaiian Hams met 31 strong and organized a temporary club. On July 24th the second meeting occurred, at which the temporary officers became permanent for one year, and articles of affiliation with A.R.R.L. were filled out. Convention committees reported all details completed except sale of tickets and publicity. J. H. Rasor, W6DMK, and Glen Mack, W6BZC, both of Los Angeles, were present and told of their experiences in the recent yacht race from L. A. to Honolulu. Rasor was on the yacht *Talaya* and Mack on the yacht *Contender*. K6DYC and K6DQG will be awarded ORS at the convention. K6EVW, K6CDD and K6DPG made BPL this month. Our traffic total is 1593. Ex OH 6 CBC of 1922, King Spark days, Mr. J. Henry Hind, Manager of Hawi Plantation on the Big Island is soon to return to our ranks as a new K6. Thanks to K6AJA, Route Manager of Hilo, for much increased interest on the Big Island.

Late news (added by Headquarters) — We have just heard of the success of the Hawaiian Section Convention, which was instigated and planned by SCM Walworth. His efforts on behalf of the Hawaiian hams in putting the convention over were particularly fine and every K6 owes him his hearty thanks. FB, K6CIB! Portable K6EIG was installed at convention headquarters and very successful communication was maintained from the convention.

Traffic: K6EVW 327, K6CDD 251, K6DPG 239, K6EWB 169, K6AJA 115, K6DUD 107, K6DV 99, K6ACR 87, K6EST 67, K6COG 37, K6CMC 20, K6CMP 20, K6DQG 15, K6ERO 15, K6ERH 10, K6BJJ 9, K6ALM 4, K6EXP 2.

SAN FRANCISCO — SCM, C. Bane, W6WB — Activity this month seems to have been slightly on the uphill trend. Several of the boys announce that they have finished rebuilding and promise bigger and better things this winter. W6ERK leads the parade with a total far below his normal output; due probably to his installing 3500-ke. phone. W6DFR is continuing to hold his regular Army-Amateur skeys through all the summer QRN and is working on both 3- and 7-mc. bands. He was in nightly communication with W6DBD while the latter was up in Alaska. W6DBD returned home just about long enough to say hello and took off again for Alaska. W6EKC reports as usual. W6DPF deserted his radio to go deer hunting. W6BIP says that traffic is scarce on 7 mc. band. We are glad to announce that the former well known AC8WB has now moved to the States and plans on settling in San Francisco. He will sign W6HN. We were greatly astonished to receive a report from our old friend W6DZZ. W6PW has returned from the Army Reserve camp. W6AMP now proudly sports the new call W6DK. W6BIP also proudly signs W6MU. W6WI sends in one of his very rare reports and says things rather dead on 7 mc. W6EPT says his new transmitter fails to perk. W6CIS is looking around for a power supply to conform to the new regs and will be on as soon as he finds one. At the last minute we learn that W6BAA is now the proud papa of a little daughter. Congrats, OB! W6WN just got back on and wants to handle lots of traffic. Look him up, men. W6ERK requests anyone desiring schedules to get in touch with him. Your SCM will be very happy if anyone in the section having a China sked will get in touch with him real pronto.

Traffic: W6ERK 97, W6DFR 61, W6EKC 33, W6BIP 35, W6DPF 27, W6DZZ 15, W6PW 8, W6DK 5, W6WI 4, W6WB 2.

QST FOR OCTOBER, 1930

EAST BAY — SCM, J. Walter Frates, W6CZR — W6ALX is top man in traffic again this month. W6EDK has moved his QRA but is again on the air, using the 3500-ke. band as usual. In spite of the fact that he has been traveling between Oakland and Medford, Oregon, keeping an eye on both branches of his insurance business, W6RJ has managed to keep his skeds going and handle the traffic which they entail. W6AQO is back among the traffic men again with a sizeable total. W6ZX has finally gotten back on the air with a pair of 210 tubes working into a voltage fed Herts, and has made his bow among the traffic handlers. One of his first stunts on the air was to help an East Bay man, who had been robbed in Honolulu, get some assistance from his home. W6AQ, the CRM, announces that he has a bunch of nice new cards of warning to the ORS and that there are things doing in the wind. FB. The DX season is approaching again and the section will have to take its old place at the top of the traffic column. W6CGM has been kept on the move, commuting 45 miles every day to his new job in San Jose. W6ZA is now proudly wearing the laurels of a married man. W6GQ has been working considerable DX with a 210 tube which his son, W6CFD, built as a portable. W6IP, now on KDUY, radioed from HU that he had been in a hospital at Seattle for an operation. W6NO also reported from Cristobal, Panama, where he is starting out on a four months' voyage to South America as operator on the S.S. *Corinto*. W6CUM-W6EDS announces that QRM has been crippling him considerably. W6AKB of Alameda has moved his QRA, taking the OW, W6ALH, along with him. W6ASJ has been occupying his time getting a good crystal for his transmitter, and in assisting W6IT, W6AQ, W6AKB and W6AOJ in reorganizing the Oakland Radio Club. Two events have taken place so far — an open house and an "old-timers" hamfest and smoker at the California Hotel. Talks, contests, a banquet and prizes occupied the evening for the latter. No one in the section so far has heard from W6BSB, who has been calling since Aug. 17 from Greenland with the second Roumanian Arctic Expedition, CVH and XORC. W6BSB has announced that he will continue to call W6OT and W6GB until a contact is made on 7350 kc. The effort of W6GQ and W6CZR to get in touch with South Pacific ham stations during the excitement over the wreck of the steamer *Tahiti*, 450 miles from Rarotonga were unsuccessful due to QRM and poor transmission conditions. W6AQ will install a portable traffic station under his own portable call for the section at the coming flower show in San Leandro. W6ARI announces that he has been off the air, due to the fact that he has no B batteries for his receiver. The gang is expecting a visit from J3CR of Osaka, Japan, who is on a visit on the Pacific Coast from the Land of the Rising Sun. He met W6IP in the Orient and W6IP directed him to Oakland for his first stop. Everybody is making plans to attend the coming Pacific Division Convention in Sacramento. See you there!

Traffic: W6ALX 235, W6EDK 170, W6RJ 43, W6AQO 27, W6ZX 24.

SACRAMENTO VALLEY — SCM, Everett Davie, W6DON — W6EOU reports the $\frac{1}{4}$ kw surely fb. W6BBW, W6BID, W6EFM, W6EAG, W6DKW and W6DGJ are new and active additions to the Capitol city gang. W6BYB and his brother, W6CGX, have been working during the summer vacation. W6ELC has a new a.c. sg rcvr but reports are light interference bad. W6EJC and W6BYB lack Africa for WAC. W6EFM kicks out with a 210 on 7 mc. Quite a large percentage of the gang are using a.c. sg rcvrs. W6DON is putting up a new lattice-type 50-ft. mast. W6DYF, W6AXM and W6DLB have been attending the N. G. encampment. W6ADL returns from the Boy Scout camp where he was employed as chef. W6AXM uses a 250-watt in tptg ckt. W6AFU has quit ham radio. The S.V.A.R.C. reports that plans for the Pacific Division Convention at Sacramento in October are progressing nicely. W6BLX uses a pair of Type '10 tubes in tptg with 1000 volts on their plates on the 7- and 14-mc. bands. W6EFO using a fifty is heard again on 7 mc. W6ECN is now on with a new 75 watt outfit.

Traffic: W6EOU 32, W6ECN 12, W6DGJ 2, W6EFM 25, W6AIM 7.

LOS ANGELES — SCM, B. E. Sandham, W6EQF — W6QP runs away from the fellows again with a total of 1177, which is real work — try it. Four make the BPL as follows: W6QP, W6BEB, W6CUH and W6EQF. The section's total is 2531 which is fb considering that vacation season is at hand. The ARRC now meets at the Odd Fellows Temple and a large attendance is anticipated with fall in the

XIII

offing. The ARALB at Long Beach holds interesting meetings and is cooperating with the women's air derby from that city to Chicago. The Pasadena Short Wave Club offers interesting technical talks at its meetings. Will other clubs please forward information to the SCM monthly? W6QP and W6EQF now alternate mornings with KA1HR. W6BEB is using two 204s in push-pull. W6ETJ, the Chief Route Manager, has new 203a and sends in good tlc report. W6TE has extra first-class ham ticket. W6CUH had skeds with the yachts racing to Honolulu and kept the owners and newspapers supplied with information. W6ESA has crystal going fb and gets R8 from CE1AH. W6EKE has been ill but sends in good tlc report. W6BCK is using two 210s and 852 in MOPA. W6BJC states that W6CRN is the new Santa Monica Club's call. W6DOZ has good total and many skeds. W6AKW says Army-Amateur net is working smoothly on 3.5 mc. He can use more stations so those interested get in touch with him. W6WA is off temporarily. W6AOA from Bakersfield visited the SCM and reports a new ham there with call W6BFS. W6AGR was also QSO with yachts in race and is using PDC on his xtal. W6CBW is still QRL at KTM. W6CZT has W6ERL as a neighbor. W6DLI is at sea most of the time now. W6ERL is joining USNR. FB. W6DZK rebuilt revr. W6EEP sends in tlc report. W6AKD is using push-pull xmttr from June. QST. W6WO is using 852 with rectobulbs now. W6ASM has commercial ticket now and is ready for a spell at sea. W6UJ will be on regularly soon. W6BUZ says vx very poor. W6ID has given up the A.C. revr as bad job and gone back to the reliable Schnell circuit until more information is at hand. W6AM's new QRA is 4214 Country Club Dr., Long Beach. W6AXE is changing from TPTG to MOPA. W6OF sold his rectifier and filter. W6ACL has new a.c. revr operating and changed from TPTG to Hartley. W6EQD is rebuilding. W6CXW has xtal going fb on 7120 kc. W6HT announces his recent marriage. We all wish him luck and happiness. W6DZI was QSO with one of yachts. W6AWY is installing xtal. W6FJ is QRL work. W6CZZ is QRL building cabin in mountains. W6BGF is rebuilding at new QRA. The Long Beach Club is sponsoring the next A.R.R.L. quarterly banquet. W6ABR (ex7PU) sends in his first report with good total.

Traffic: W6QP 1177, W6BEB 202, W6ETJ 169, W6TE 140, W6CUH 117, W6EQF 90, W6ESA 66, W6EKE 66, W6BCK 64, W6BJC 55, W6DOZ 53, W6AKW 47, W6AOA 42, W6AGR 31, W6CBW 25, W6CZT 23, W6CLI 13, W6ERL 12, W6DZK 10, W6EEP 10, W6AKD 7, W6WO 7, W6ASM 7, W6UJ 6, W6BUZ 5, W6ID 5, W6AM 5, W6AXE 4, W6OF 4, W6ACL 4, W6EQD 4, W6CXW 2, W6HT 2, W6DZI 1, W6ABR 56.

SAN DIEGO — SCM, H. A. Ambler, W6EOP — W6AXV again leads the section and has moved his station. W6BGL sent in his report via Radiophone. FB, OM. W6CTR also reported via Radiophone. W6ADC is back with us again. W6EPZ is now in the Navy. Good luck, OM. W6BAM says the new a.c. receiver is the berries. W6EOS had his portable along on vacation and says he had lots of good contacts. W6ACJ was away most all month with the Naval Reserves. NDT, Naval Reserve Station, is now on the air and would like to contact amateurs on Tuesdays and Thursdays. Anyone wishing dope on the Naval Reserves write to W6ACJ. W6AEP is rebuilding and says he has a new YL operator, born August 14th. Congrats, OM. W6DNL is away on a cruise. Several new hams took the exam last month and got their tickets. The SCM would like to hear from all new hams and would be glad to see them in person at his shack.

Traffic: W6AXV 136, W6BGL 24, W6EOP 12, W6ADC 10, W6BAM 7, W6EOS 6, W6ACJ 4, W6AEP 3.

NEVADA — SCM, K. L. Ramsey, W6EAD — Things were quiet this month in Nevada. The Nevada Amateur Radio Association held its first meeting August 19th since adjourning for the summer and arrangements were made for some talks by some of the fellows, W6CDZ being the first with a talk on "Frequency Meters and Revised Government Regulations." Plans were made to resume work on the Club Shack. W6CRF is installing a crystal in his 3500-kc. phone. W6CDZ and W6EAD have new frequency meters which come up to the OFS standards.

Traffic: W6AJP 3, W6EAD 2.

PHILIPPINES — Acting SCM, John R. Schultz, KA1JR — KA1HR handled the usual high total, keeping schedules with KA9PB, AC8ZW, OM1TB, W6QP, AC8AG, AC2AY and AC3XJ. KA1SU at Manila is exW6AH. He is operating in the 7000-kc. band with a 50-watter.

Traffic: KA1HR 880.

ROANOKE DIVISION

WEST VIRGINIA — SCM, D. B. Morris, W8JM — Hams in W. Va. seem to be getting ready for a great season of brass pounding. W8BOK, our new ORS, reports the following news: W8DIG, a new ham, is on 3500 kc. W8CMJ and W8CVK are active on 3500 kc. W8AWT is rebuilding for 3500 kc. W8AYI got his commercial ticket in Baltimore. (FB.) W8TI received his portable call, W8ZZD, which he will operate at W.V.U. W8ACL is now W9BF in Chicago. W8DPO took a message from K6CDD. W8BWK and W8COV report. W8JM using Ex-W8ACZ equipment handled a few messages. W8BCN is going to try MOPA again.

Traffic: W8JM 22, W8BCN 15, W8DPO 9, W8BOK 8, W8AYI 3, W8TI 2, W8BWK 2, W8AHZ 2, W8DPD 1.

NORTH CAROLINA — SCM, H. L. Caveness, W4DW — Due probably to my being a new man on this job, the reports have not found their right place this month. W4ZB comes in with a good total, however, and informs us that he has visited W4AEW, W4UB, W4AKU, W4JR and BX7. BX7, the 250-watt TPTG Army outfit from Ft. Bragg, N. C., worked amateurs up to October 1st from Myrtle Beach, S. C. W4TN is building xtal transmitter and hopes to get it on the air before he enters law school at U.N.C. W4EG has all the necessary parts for his xtal-controlled 50-watter. W4OC has completed a push-pull transmitter for the 14,000-kc. band. FQPM and his OW recently paid W4OC a delightful visit. W4MI, W4AGO, and W4EG are trying to do A-A work on 7000 kcs., while W4CC, W4JR, W4QO, W4TN, and W4DW are doing the same thing on 3500 kcs. W4UI and W4VI are just getting on the air in Raleigh. W4AA's report for July was ten days too late to get into the right month's report. He had a nice total of 71, however, and says his best DX was VO6GR. W4NG was also late; total 9, DXW 6 — and W7 —.

Traffic: W4ZB 52, W4TN 11, W4DW 8.

VIRGINIA — Aest. SCM, Ted P. Mathewson, W3FJ — J. F. Wohlford of W3CA was reelected our SCM. Now, gang, let's give him our support by reporting regularly. We want to keep Virginia on top of the Division. The SCM welcomes Capt. Baldwin and W3CXM to Virginia. His first report is surely appreciated. He has a crystal-controlled outfit in Alexandria. Dot Gray ex-W3CKL is now W2CKO in Schenectady, N. Y., and has his xtal rig on 7030 kc. W3AMB now has a 50-watter and an ORS certificate. W3FB is busy with convention plans. W3BGS is getting out fine on 7000 kc. W3ZA is still hitting the high spots with his phone. W3BDZ works 3.5-mc. crystal-controlled when shack is cool enough. W3FF will be on the air soon. W3WO is back with us again. W3AAJ is on consistently despite his convention activities. W3AVY is heard on phone. FB. W3KG is working for the power company now and should be able to swipe some good juice. Hi. W3BZ is still tinkering when the weather permits. W3FJ spent two weeks at Virginia Beach with National Guard.

Traffic: W3CXM 101, W3AAJ 3, W3ABC 1, W3FJ 23.

ROCKY MOUNTAIN DIVISION

UTAH-WYOMING — Acting SCM, C. R. Miller, W6DPJ-ZZZ — Traffic was light this month, due to the heat and the attraction of miniature golf courses (?). W7AAH leads the section in traffic. W7AAG is helping to put Wyoming on the map. W7HX is on occasionally. W6CNX was ill, but has recovered. W6DPO has taken up miniature golf, hi! W6ZZZ is off for a while.

Traffic: W7AAH 19, W6ZZZ 12, W7AAG 9, W7HX 9, W6CNX 9.

COLORADO — SCM, C. R. Stedman, W9CAA — W9BCR leads the brass pounders this month with 92 messages. W9BCR is the station of the Boy Scouts at Camp Horne. W9ECP at Greeley is handling traffic with them on a regular schedule. W9EDM is radio instructor at the Scout camp. W9DQD is working on 7000 and 14,000 kc. W9EFP is about through harvesting his crops and will soon be ready to start radio again. W9EAM is spending his spare time fishing. W9GBQ is the new Secretary of the Denver Radio Club. W9CHV is still a ham when not busy with official duties. W9CHK will soon be going now that he is out of the hospital.

Traffic: W9BCR 92, W9DQD 23.

SOUTHEASTERN DIVISION

PORTO RICO-VIRGIN ISLANDS — SCM, E. W. Mayer, K4KD — K4AKV is leaving for the States whereby the section loses its most dependable ORS. You will be missed, Om, and our good wishes go with you.

K4DK has dismantled pending locating suitable quarters for his station. K4AAN lost his tennis championship as well as his ORS. Better luck, OM. K4KD is trying 28 mc.

ALABAMA — SCM, Robert Troy, Jr., W4AHP — W4AAQ leads the state in traffic. He is taking a position with WSFA in Montgomery. We are sorry to say that W4AHR is off the air permanently. W4PAI has his commercial ticket. FB, OM. W4AG is coming back after the summer slump. W4AX has been on Naval Reserve cruise to Havana. W4AGI is having fine time on vacation in North Carolina. W4OH and W4IA are finishing up two of the finest fone outfits we ever saw. W4DS is active. W4TH, old 5DI, who is with RCA, visited Selma. W4TI will be going strong as soon as cool weather comes. W4AJR is happy. He has his longed-for bug. W4EW had a bad accident recently. We wish him a speedy recovery. W4AP has been vacationing. W4AKM is busy with summer school. W4AHP is rebuilding and will have a much better outfit on soon. W4ZI is putting in crystal control. W4ZX, in Montgomery, is coming along. W4AHO operates occasionally. W4AEG of West Palm Beach, Fla., is visiting in Montgomery. W4VC, since the first of the year, has shot a plate transformer, blown one rectobulb, blown three 210's, blown a 2-mfd. filter condenser and broke the glass of an 852! Some one beat that hard luck! The W4LM twins are becoming expert crystal grinders. W4DD, a new ham, is getting on fine.

Traffic: W4TI 5, W4AJR 3, W4AAQ 29, W4LM 10.
FLORIDA — SCM, Harvey Chafin, W4AII-W4PAW-W4ACM, the U.S.N.R. station at Tampa, is the second highest station this month. W4AGB reports. W4JO is on the air on Thursdays for U.S.N.R. drill. W4QN is experimenting with push-pull transmitters and filters. W4AFT reports bad QRN in Panama City. W4CK has three skeds a week. W4AEM has been appointed an ORS. We find W4EY back on the air this month after a long absence. W4VU is home now. W4AIV is a new station at Nichols. W4MM has gone back to low power. Extremely bad QRN and general slumps cut W4ALH's traffic total this month. W4NF at St. Augustine has been operating for the National Guards for the past two or three months. W4TB and W4SY have been working out plans for a transmitter for the Tampa unit of the National Guards Artillery. W4JM has three crystals, two on 7000-ke. band and one on 1750-ke. band. W4AKA came over to Tampa with W4TB and visited some of the Tampa gang. W4TK says they are organizing a ham club in Jacksonville. FB. Fellows. W4KM is using TPTG push-pull. W4SK has added a new xtal monitor to his equipment. Bill Dade, W4DC, is a new ham up in Orlando. He got his start from W4ABF. W4QN is trying out the new chemical rectifier described in July QST. W4ZU took the examination in Tampa and now has an amateur first grade ticket. FB, OB. W4ZV is playing football now. W4AKH is back in Jax after spending some time up in North Carolina, where he visited W4HA. W4UJ and W4AKH have been working on 7000 kc., as 14,000 kc. is dead as a door nail. W4UJ's new QRA is 405 Cedar Street, So. Jax. W4ALF of Unit 3, Section 3, U.S.N.R., wants to route a chain of schedules to California. Come on, fellows, let's give them some real skeds. The SCM was very glad to meet W4AGR in person this month. W4AFC is trying out a few xtals. W4MS, our RM, wants each ORS to report skeds to him each month. W4FV will be on in the early fall. YLs are keeping W4VR off the air, but his airplane keeps him in the air. Hi. W4PN is putting out a fine signal. W4ALJ and W4MX are new stations in Pensacola. The XYL at W4MS operates as much as the OB. The West Florida hams had a hamfest at Pensacola on Labor Day and a number were present. W4NF is a new station at Daytona Beach. W4QP is applying for ORS appointment. The following are new stations at Eustis: W4AIA, W4AKI, W4ADB, and W4AHK.

Traffic: W4AII 120, W4ACM 52, W4ALH 31, W4ALF 31, W4AEM 22, W4AKI 21, W4AFT 21, W4MM 20, W4QN 18, W4JM 18, W4KM 18, W4NF 12, W4AGB 10, W4AKA 10, W4UJ 9, W4SK 9, W4ZU 8, W4JO 6, W4ZV 4.

WEST GULF DIVISION

OKLAHOMA — SCM, Wm. J. Gentry, W5GF — W5VQ is again high man and takes an ORS certificate. FB, OM. W5AMU is another new station to report. Glad to have you in the list, OM. W5AMC is another new ham. Welcome, OM. W5ASQ has been on 28 mc. W5ABO at last got his ticket. Hi. W5CB is below par on his traffic. W5OJ had some good dx this month. W5GF is in the Naval Reserve now — Radioman 1st Class. W5HJ is going back to school soon. W5AAV is always busy with BCL

sets. W5MM and W5QL are going good now. I want to thank the Dallas Gang for the fine time I had with them on my visit there. Now, Gang, the weather is getting cooler so let's get busy.

Traffic: W5VQ 231, W5OJ 33, W5BMU 27, W5HJ 18, W5CB 11, W5AMC 3, W5GF 3.

NEW MEXICO — SCM, L. Wheeler, Jr., W5AHI — W5TV returns to us a full-fledged member of the U.S.N.R. and will probably have command of Section 6 (N. Mex.), 11th Naval District. Those interested in enlisting in the Reserve or becoming Navy Amateurs are urged to communicate with W5TV for full particulars. W5EF is working a new 852 with good results. W5AJL is getting lines up for lots of traffic this fall. Business was good and W5AHI was boosted into the BPL.

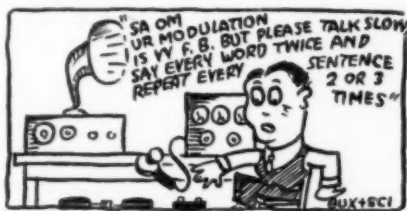
Traffic: W5AHI 222, W5EF 23, W5AJL 15.

SOUTHERN TEXAS — SCM, H. C. Sherrod, Jr., W5ZG — In opening this report I would like to thank everyone concerned for the honor bestowed upon me in the election for SCM of this section. If I can continue to handle these reports in the consistent and creditable manner exhibited by Mr. Franklin, W5OX, I will be more than satisfied. To begin with, two Official Broadcasting stations for this section are wanted, one to be located in or about San Antonio and the other in Houston. The application of any active station in this section will be considered. Get in touch with our Route Manager, Mr. F. H. Ward, W5EI, in Houston. W5WL is building a master oscillator rig and the desk is resplendent with a brand new A.C. receiver. W5LP, Chun, is on and handling traffic despite the impending QRM from Rice soon to come upon him. W5BIZ (Ex-W3LN) is now in Houston and will be on shortly. W5GS is building a short-wave converter for use on a super. W5BKW, Havard, has been busy rebuilding the rig for full operation. W5PK, DeBardeleben, relayed twelve and originated four making a total of sixteen. W5BHO, Calk, is on 7000 kcs. with a new power supply and is experimenting with low power. W5SY uses all waves for his QSO's. The gang at W5IV had a great time at W5SY. W5AMG has been very busy at KPHC. Much has been heard about the CQ party held by W5TD, W5BHO, Charlie Loving, and W5ASM. W5AEA has been vacationing in Colorado. W5AHA is a very efficient and active ham from San Antonio. W5NW is operating his portable station W5MZ. Things are pretty quiet in the southeastern part of the state. W5AZS in Port Arthur is heard occasionally. W5AFG is still working on the xtal-controlled phone. San Antonio is very quiet. Come on fellows, and get one of those O.B. stations there. Galveston is represented by W5AUX, W5AVC, and, when it's working, W5ZG. W5EI reported. W5AUX is working on the xtal rig. Let's make next month a bigger and better one, fellows, and LET'S HANDLE SOME TRAFFIC. SEND IN THOSE REPORTS!

Traffic: W5EI 7, W5BKW 23, W5ZG 63.

NORTHERN TEXAS — SCM, Roy Lee Taylor, W5RJ — W5HY handled a Death message to China via K6CDD. FB, OB. W5BAM reports he is still hunting power leaks. W5BIT is on with an 852. W5BEK is still working DX. W5RJ is off the air on account of a 7-lb. daughter born August 13th! W5LY said he had unlucky number of messages, but it is O.K. Hi. W5ASP of Wichita Falls is new Route Manager of Northwest Texas. Write him for schedules. W5ALA spent a vacation in California. (Hollywood?) W5BBF-W5RH says power leaks keep him off the air. W5BAD still pounds out a few. W5BIP reports that a good amateur club has been started in Wichita Falls. W5DF burnt his hand with 1200 volts, so no traffic. Come on, fellows, let's get ready to put the Section over big this winter. More ORS are needed.

Traffic: W5HY 94, W5BAM 26, W5RJ 18, W5LY 13, W5ASP 12, W5ALA 10, W5BBF 5, W5BAD 4, W5BIP 3.



THESE AMATEUR FONES
RS. I HAVE ONE TOO - GUX

CANADA

This report goes forward to Headquarters minus several divisions' reports. It is too bad that your SCM cannot spare the time to forward the reports that you ORS have sent to him. If you are in a division whose reports do not appear in this issue, it is up to you to write your SCM and demand a reason for his not forwarding his monthly report to me in time to go to Headquarters.

With the exception of the Quebec Division, reports have fallen off, and those reporting show a marked decrease in the amount of traffic handled. This is natural during the summer months, and the usual slump is always expected. However, next month marks the beginning of the fall season and all SCMs reporting are confident that, with the number of new stations and the old standbys, the winter season of 1930-31 will be a record-breaker as far as traffic goes, so dust her off, gang, and let's all get off to a flying start.

A message has been received from VS6AG stating that Hong Kong amateurs are anxious to QSO Canadians on 14,000 kc. A Canadian has not been QSOed by a "VS" station in two years. Let's go, gang, and show them it can be done.

CANADIAN GENERAL MANAGER

ALEX REID, VE2BE

QUEBEC DIVISION

QUEBEC — SCM, Alphy Blais, VE2AC — Outstanding work this month and high honors go to VE2CA and his XYL for emergency traffic handled between VE3RF and VE2CA. Details about a lady's illness was relayed from VE3RF via VE2CA to relatives in Montreal, saving folks in Montreal from worry and an unnecessary trip to Toronto. The lucky boy this month is Tommy, at VE2BG, who had the visit of Disley and Aitkins, radio operators of the dirigible *R-100*. Disley is a member of the R.S.G.B. Tommy had the much envied privilege of visiting the radio shack on control car of *R-100*. VE2BB has a new electric (A.C.) short-wave receiver built by VE2AP. He had two visitors this month — VE3JL and W2CDQ. Two professors in physics and chemistry at the Laval University visited the shack at VE2AC, in view of installing short-wave apparatus in the laboratory of the University. W2BNX stopped at VE2CA for a rag-chew. Earle is coaching a new ham, VE2CL. General reception conditions were poor all month. Little DX was worked. A fair amount of traffic was handled. VE2AC has sked with W8DII. VE2BB reports VE2AP is sick. Hope you recover promptly, John. VE2AC heard Yacht Mopelia, DAIV.

Traffic: VE2AC 60, VE2BB 5, VE2BG 5, VE2CA 21, VE2BE 22.

ONTARIO DIVISION

ONTARIO — Acting SCM, C. D. Lloyd, VE3CB — VE3FC, our genial SCM, is spending a well-earned holiday at Sturgeon Point, Ont. A pleasant vacation to you, OM! VE3GM has returned from Boston, having kept in touch with his home via short wave phone. VE9AL has returned from vacation and is doing his daily dozen again on the 3500-kc. band. VE3HE is hitting the high spots on 14 mc. VE3BT is still experimenting with a new up-to-the-minute phone outfit, crystal-controlled. VE3DW is working hard at both farming and ham radio. Mrs. VE3DW is also heard pounding the brass. VE3AD got his outfit in working order after transporting it to Milford Bay, Muskoka. Owing to poor antenna location results were not so good, so he moved in with VE3CR at Beaumaris, and finds conditions much better. VE3GK has put up a new 7-mc. Zepp and is preparing to do a Steve Brody to the 14-mc. band. VE3GT reports conditions very fair up to August 1st and piled up a good traffic total. VE3HA writes from the great Northland that northern lights wreck everything at night. VE3BC is debating whether to go in for ham radio or YL's when he finishes his trick with the Forestry Branch this fall. VE3AP is collecting meters, etc., in preparation to going on the air this fall at Grand Valley, Ont. Welcome

XVI

back, OM. VE3CR is rebuilding, using Hi C circuit, after "shooting the works" early in the month. VE3CB is doing the odd job at the key. Northern District — Acting SCM, G. V. Lawrence, VE3ET — VE3HD made his first DX contact when he snagged DAIV. VE3BD says conditions are still bad up his way. VE3DM is getting the parts together for an RAC power supply to replace his B Batts. VE3BZ says that all his spare time is taken up by canoe and other summer camp activities. VE3FQ wrote VE3ET a nice neway letter for his first report. Jack Dorland will soon represent Cochrane on the air. Watch for him, gang. VE3DR is having a tough time getting two 852s to perk properly in a TP-TG push-pull. VE3HA keeps sked with VE3BC.

Traffic: VE3GK 4, VE3GT 31, VE3CR 2. Northern District: VE3HA 25, VE3ET 1.

PRAIRIE DIVISION

SASKATCHEWAN — SCM, W. J. Pickering, VE4FC — Conditions are at last improving and it looks as though this section is going to be more active than ever this winter. VE4BB wants to hear the gang Sunday mornings. VE4FK is rebuilding. VE4HP and VE4HD have to get new B's for power. VE4GR has managed one or two local QSO's at last. VE4AV, our new XYL, is getting out in fine style. VE4FC is on more often lately. Here comes a little QRN from Moose Jaw at last — "Hello! Gang, don't think the hot weather has got us down; we still have a little water left in the old swimming hole and able to come up without mud on our heads." Boys, let's congratulate VE4EI. The OW and OM are having a domestic conflict as to who is to own the gilt edge for their certificate of proficiency. Congrats, Mrs. Sparks. You will be replacing that ticket with a Comm'l yet. Another old timer came to life last Sunday when Dave Mathias, VE4CT, came out of a junk box with an armful of antiques Saturday night and was pumping out a D.C. sig with his 210 Sunday afternoon. FB, Dave. VE4HH is too busy chasing that white pill around the links to find time to don the cans. VE4HL was heard last Sunday. VE4GU has been fighting a battle to keep up his skeds. VE4HU has been putting in so much time on his air motor cutting props for it that his yard looks like an airplane factory. If any of the hams hear VE4JS, pee QSO (if necessary) by mail.

Traffic: VE4BB 11, VE4GR 2.

VANALTA DIVISION

BRITISH COLUMBIA — SCM, J. K. Cavaleky, VE5AL — The Vancouver gang got summer fever and looks like a poor showing this month. VE5AC is on once in a while. VE5BM struggles with his sked to Prince Rupert, but says conditions have been terrible. VE9AJ blew the rectifier tube. VE5BP is working locally but isn't satisfied with results. VE5FI hopes to be on again shortly. VE5AL tried a push pull Hartley and worked 1000 miles in daylight using 201A on 7000 kc. Victoria is all set for the convention. VE5CO is teaching the OW the code. VE5DU is perking fb. VE5EC blew his 281. VE5CB has been under the weather so not much doing. VE5HP has a mg working. VE5AG has changed to Hartley. VE5AE and VE5CJ get on occasionally. VE5AD is operating for CPC. VE5DY is going away for three months. VE5DX in Prince Rupert manages to get on the air whenever he gets into port. VE5GT says that conditions on 7000 are the worst he has ever seen. VE5CM is on the air when he comes to town. VE5AW finds it much easier to work Asia than to work any of the gang in B.C.

Traffic: VE5EC 5, VE5CO 1, VE5AC 3, VE5AL 4.

MARITIME DIVISION

NEWFOUNDLAND — Acting SCM, E. V. Jerrett, VO8Z — Although operating activities were practically at a standstill during the summer we are glad to note many of the boys preparing for an interesting fall and winter by the addition of much new equipment. VO8WG spent a pleasant holiday home from the North and reports a new fifty watt and generator for the coming season. VO8MC reports adding a new Monitor to his equipment. VO8AW has a new four tube Screen Grid Receiver. VO8AN has installed a new power supply for his two 852s. VO8Z has started work on a new fifty watt transmitter. VO8O is a new comer at Cartwright, Labrador. Welcome, OM.

QST FOR OCTOBER, 1930

"Our CeCo Radio Tube sales have increased 30% in the last 2 years—proof of CeCo's high reputation."

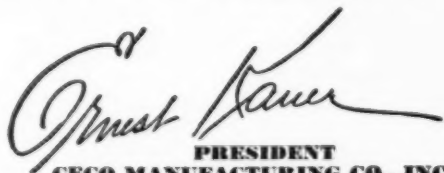
A. Morofsky, AMCO RADIO STORES, INC., NEW YORK, N. Y.

Another recent development of the CeCo Engineering Laboratory—the non-electrolytic press, used in the CeCo type 280 Rectifier, prevents stem air-leakage, insures this tube against abrupt failure . . . and protects power packs against a fault which has been largely responsible for their destruction."

DO YOU KNOW?

1. CeCo is recognized in the Radio Industry for leadership . . . financial soundness . . . and stability.

2. Forty-two specialty engineers are constantly working to improve CeCo Radio Tubes.



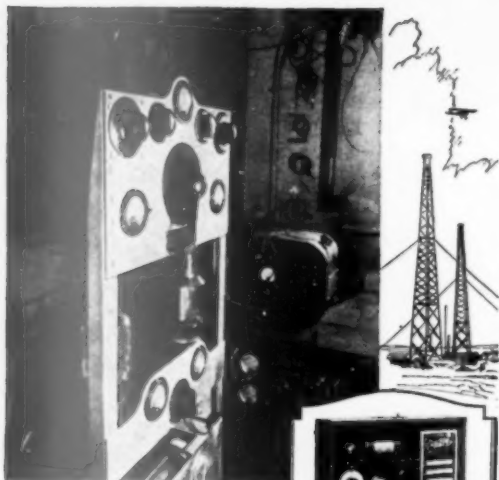
**PRESIDENT
CECO MANUFACTURING CO., INC.
PROVIDENCE, R. I.**

CeCo Radio Tubes are licensed under patents and applications of the Radio Corporation of America and affiliated companies.

CeCo

**1930
Radio Tubes**

Say You Saw It in QST — It Identifies You and Helps QST



Showing eight of the many Weston Instruments used in the radio cabin on the "City of New York."

in "Westons,"
Byrd found
the

DEPENDABILITY he needed

WHEN Commander Byrd formulated plans for the long stay in the Antarctic, a very important task was the selection of equipment that would give service under the most adverse conditions.

There were no service organizations, factory representatives, nor extensive repair facilities in Little America; but a group of men, thousands of miles from civilization, whose lives and hopes depended upon the reliability of their equipment.

Only Radio could penetrate their isolation. It was radio that carried daily messages to the waiting world, that kept exploring parties in touch with Little America,

and with Commander Byrd in his flight over the South Pole. And Weston points with pride to this important and unfailing radio service which was controlled with Weston Instruments — instruments not made especially for the expedition but taken directly from our standard stock. Again Weston has kept faith.



The 2" and 3 1/4" Weston D.C. and Thermocouple Models were used by the Byrd Expedition.



Three Weston Instruments were used on this portable radio transmitting and receiving set.



Weston Electrical Instrument Corp.
602 Frelinghuysen Avenue Newark, N. J.

BRITISH NOTES

By J. Clarricoats, Hon. Sec. R.S.G.B.

Chief interest during June centered around the Loyal Birthday Relay and with the *Southern Cross* transatlantic flight. In connection with the former, we are pleased to record that nearly B.E.R.U. groups succeeded in forwarding British stations, messages of greeting to our Patron, H.R.H. the Prince of Wales, on the occasion of his 36th birthday. The messages were delivered to St. James Palace, by Mr. Arthur Watts, our Publicity Manager. The Prince in acknowledging the messages asked that the following be sent to all B.E.R.U. groups:

"The Prince of Wales sends you sincere thanks for your good wishes which his Royal Highness much appreciated."

The members of the R.S.G.B. were asked to coöperate with the wireless operator on the *Southern Cross*, and it was indeed pleasing to find that a large number were enabled to supply useful and interesting information at the completion of the flight.

During July the annual summer outing took place when the Dorchester and Somerton Beam stations were visited.

The summer months in Great Britain are normally periods for spasmodic activity, local conventionettes, and station visits. The social side of amateur radio would appear to be even more valuable sometimes than the experimental side, judging by the vast number of new "ham" friendships which have sprung up throughout the world. The value of these personal contacts cannot be underestimated and should be encouraged at every opportunity. Recently in London we have had the pleasure of meeting Mr. Larsen (ZT5S) of Durham, and Mr. Lederer (UN7XO) of Zagreb, but we feel that many of our overseas colleagues slip into our country without giving us a chance of bidding them welcome. We do earnestly suggest that it is the duty of each Headquarters Society to give letters of introduction to their members who may be travelling to other countries. The members of the R.S.G.B. are most anxious to welcome such visitors, and through the medium of these notes we invited all who journey to Britain to get in touch with our Hq's at 53 Victoria Street, S. W. 1, if they have no definite address to visit.

Within a few weeks the Fifth Annual Convention will be held in London. We would impress on all who may be interested the importance of the various European countries being represented, in order that they may place before our members the opinions held by their Society. At the London Convention many subjects which have been recently discussed in Antwerp will be reconsidered, and recommendations can be put into operation. The London Convention commences at 5 p.m. on Friday, September 26th, and is to be held in the Institute of Electrical Engineers. Intending visitors are requested to write to the Hon. Secretary at the Hq. address.

Interesting work on 56 mc. and 112 mc. has been carried out by groups of British amateurs

25 TESTING INSTRUMENTS IN 1 ONLY ONE METER TO READ

**SET
ANALYZER
THAT**

**PUTS
ALL
OTHERS
IN THE
"OLD MODEL"
CLASS.**

Supreme Set Analyzer

Model 90

Size 4 1/4 x 9 1/4 x 11 1/4

Weight 6 lbs. Dealers'
Net Price, F.O.B.
Greenwood, Miss.

\$78.50.

List Price \$112.15.



**SMALLER
FASTER
MORE EFFICIENT
ULTRA-MODERN**

THROUGH the selection of a single meter, used only in costly laboratory equipment heretofore, the Supreme Set Analyzer offers a smaller, handier, one meter analyzer, that gives a vastly greater number of tests and functions than any other set tester or analyzer, regardless of the number of meters employed!

WORDS can't adequately detail its superiorities. Comparison will convincingly prove that the Supreme Set Analyzer Model 90 provides 79

distinct readings and ranges as compared with a maximum of 20 readings and ranges by its nearest competitor. This vastly greater range is obtained with a smaller number of switches and with much greater ease and speed. In only one way can the Supreme Set Analyzer be compared with other analyzers or set testers. The price, \$78.50. Ask your jobber to show you this revolutionary Set Analyzer, this super-value in testing equipment — "Supreme by Comparison."



Size 3 1/4 x 9 7/8 x 6 1/16. Weight 6 lbs.
Dealers' Net Price, F.O.B. Greenwood, Miss.
Counter Type \$26.95
Portable Type \$29.95

The Master Stroke in Tube Checker Design SUPREME TUBE CHECKER MODEL 19

NO other Tube Checker selling below \$40.00 can rival its facilities. Designed to be so extremely simple in operation that any layman can check tubes with quick, positive results, yet Model 19 appeals to the most precise demands of the advanced technician. Large 3 1/2" D'Arsonval movement meter in bakelite case. Full size transformer; every type of tube tested at correct filament voltages. The double purpose Tube Checker you have been waiting for — Calls and Counter work.

Size 7 1/2 x 12 3/16 x 18 7/16
Dealers' Net Price, F.O.B.
Greenwood, Mississippi
\$139.50.

In an even smaller case
without compartments
for tools, etc.



OFF TO ANOTHER SEASON OF LEADERSHIP SUPREME DIAGNOMETER MODEL 400-B

Service men, manufacturers, and technicians unite in recommending the Supreme Diagonometer Model 400-B as the most advanced and complete radio testing instrument ever produced. It is the one instrument chosen by the service man who seeks leadership in his shop and laboratory work. It soon pays for itself in extra profits and greater prestige.

All the leading jobbers have complete information and stocks on Supreme Testing Instruments — "Supreme by Comparison." If yours is not prepared, write direct to

SUPREME
Testing Instruments
"SUPREME BY COMPARISON"

SUPREME INSTRUMENTS CORPORATION
380 Supreme Bldg.
Greenwood, Miss.

Distributors in all principal cities
Service Depots in New York, Philadelphia, Pittsburgh, Chicago, Kansas City,
Seattle, Toronto, San Francisco.

Say You Saw It in QST — It Identifies You and Helps QST

RADIO BARGAINS FULLY GUARANTEED

Complete Phone and CW Transmitter 15 to 30 Watts \$39.50. Including tuned plate, tuned grid oscillator with provision for crystal control. Wired for one or two UX 210 tubes. One or two UX 250's as modulators, two stages of speech amplification. Mounted in beautiful two-tone Walnut cabinet. Has ample space for AC power supply. Price includes one Stromberg-Carlson microphone.

Power Supply unit for 15 to 30 Watt Transmitter \$19.75. Will deliver 600 volt 150 milliamperes for plate current. Has filament for 281, 210, 250, 227, and 226 tubes.

World Wide Triple Screen Grid Short Wave Receiver. A four-tube short wave receiver for the highest efficiency for code, phone and ample output for television experiments. Uses 224 in a R.F. stage, a 224 detector, a 224 resistance coupled audio feeding into a 245 power tube. Tubes used make a minimum of microphonic noises and are so wired to be used on a 6 volt storage battery. A set of 10 plug-in coils are furnished with this set covering from 14 to 550 meters. Other coils can be made to cover lower frequencies. \$28.50

World Wide 2 tube Short Wave Receiver. \$11.75. A two-tube receiver in a beautiful shielded metal cabinet. An ideal all around set which will give loud speaker reception on many stations. Very flexible in tuning. Complete with a set of 6 clip-in coils. Covers 14 to 550 meters. Can be used with any standard base tubes.

Tubes UX type. 30 day replacement guarantee. No. 210, \$2.25; No. 250, \$2.35; No. 281, \$1.85; No. 280, 95c; No. 245, \$1.25; No. 224, \$1.25; No. 227, 75c; No. 226, 65c; No. 171, 75c.

Low Power Transmitter, adaptable for phone or code. With plug-in Coils. \$14.75

Short Wave Sets, one tube complete with 5 coils, 14 to 550 meters. \$6.45

Auto Radio—Uses 3-224, 2-227 tubes and 1-245 Power tube, single dial, tremendous volume. Compact. Fits any car. We guarantee this set to perform better than sets selling up to \$150. \$20.00

Stromberg Carlson telephone transmitter on desk stand. \$2.75

B Eliminator. Dry, 180 volts, will operate up to 10 tube set, with 280 tube, fully guaranteed. \$6.75

250 or 245 Power Condenser Blocks, 13 Mfd., 1000 volt A. C. test, tapped 2, 2, 2, 4, 1 and 1 mfd., 1 mfd. \$4.75

2 Mfd. Condenser Packs, 2000 volt A. C. test. \$7.90

1500 volt. \$5.80

Double Chokes, 30 henry each, 160 mls., 1500 vt. test, shielded. \$4.95

130 mls. \$3.75

No. 1003 Power Transformers, shielded, Sec. 600 V. for one 281, one 250, one 227, four 226 tubes and 2 chokes. \$5.00

AC-A. B. C. Power Packs, completely assembled. \$8.75

250 V. B. also has A. C. filament for up to 9-tube set. Can be used as B eliminator. Make your battery set all electric, or build your A. C. set around this pack. 280 tube for this pack, 95c extra.

Thordarson Transformers, 1 to 1. \$1.00

CHAS. HOODWIN CO.

4240 Lincoln Ave., Dept. K-8, Chicago, Ill.

DEALERS IN BANKRUPT RADIO STOCKS

SHORT WAVE TRANSMITTERS— RECEIVERS and POWER SUPPLY

designed or built to your exact
specifications

Inquire about our standard designs

WIRELESS EGERT ENGINEERING, INC.

179 Greenwich Street New York City

all of whom appeal for coöperation outside of their immediate vicinity. Mr. Powditch, G5VL, our Contact Bureau Manager, Porth House, Porth, St. Colum. Minor, Cornwall, will be glad to introduce overseas members to the central operators of these special groups.

During July 7 mc. showed a marked improvement as far as local Europe was concerned, whilst on some few occasions many interesting DX stations were logged. The 14-mc. band was generally poor, South America producing the only consistent results. On 28 mc. much rebuilding is planned for the coming winter, but in general no activity has occurred mainly due to poor conditions.

NORWEGIAN NOTES

By G. H. Petersen, Vice-President N.R.R.L.

During the summer months there has been a general improvement in the rather bad conditions which seem to have prevailed over Europe during the spring, and we in Norway may report of much activity and many newcomers to our ranks. No interesting DX or other feats occurred, however.

Our negotiations with our government regarding the license conditions have been happily terminated, and the result is very favorable to the hams, conditions remaining practically as before The Hague Conference. The most important points are that the 3.5-mc. band is still open for special licenses, that a good monitor may be

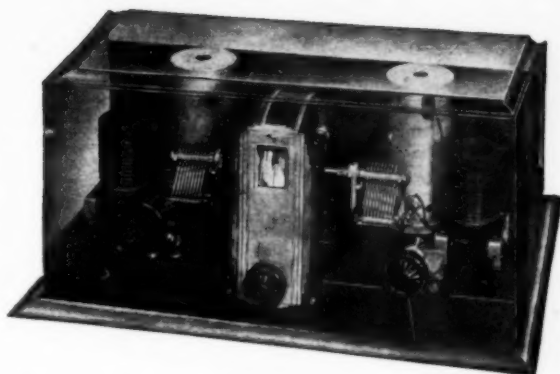


SMGUA, THE "GRAND OLD MAN" OF SWEDISH HAMDON, WITH HIS OW HELPING HIM OUT IN THE CALLBOOK

Two of the six transmitters, one crystal-controlled and one Hartley, can be seen in the window. Over 5000 cards on those walls!

accepted as a wavemeter, and that the power remains at 50 watts maximum for the last stage power input. Besides, some questions regarding message handling have been cleared, correspondence regarding personal and club activity being permissible, and the N.R.R.L. has been granted a certain controlling and qualification testing power, which is probably rather unique,

NATIONAL CO.
engineers designed
this new High-Fre-
quency Receiver in
collaboration with
Robert S. Kruse.



Write today for new
Bulletin 143-Q on
NATIONAL Ama-
teur-Equipment.

High Quality Phone Reception

Full A. C. Operation — No Hum — Push-Pull Audio

NATIONAL A.C. SW 5 THRILL-BOX

A true A.C. Amateur Instrument, tunes and logs as easily as a broadcast receiver. Actual single control; — set and forget the antenna trimmer. There are 1080 dial degrees available between 21.2 m.c. and 2.61 m.c. Easily adapted for still wider spreading of the amateur bands if desired. Very smooth control

of sensitivity either on c.w. or phone. No grunting or backlash — no hand capacity. Double screen-grid, with 224 grid-leak detection. Equipped with push-pull audio, and special phone-jack after first stage. Made also in new battery-model, using the new UX 230, 231 and 232 tubes.

Easily assembled with genuine NATIONAL Radio Parts



R. F. TRANSFORMERS

Standard set of four pairs covering from 21.2 to 2.61 m.c. Special coils also available for 33-21.2 m.c. and the 2.61-1.5 m.c. ranges.

Forms are moulded R-39, the new low loss coil material developed by Radio Frequency Laboratories. Blank forms also available for winding experimental coils.



SE AND ST VARIABLE CONDENSERS

Model SE, a special high-frequency design,

not a cut-down broadcast job. Insulated main bearing and constant impedance pigtail. 270 degree straight-line frequency plates. Model ST has 180 degree equitune plates. Either model available in capacities up to 150 mmf.



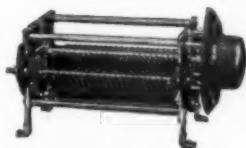
PRECISION VELVET-VERNIER DIALS, Type N

A four inch Solid German Silver Dial, for use in amateur and experimental equipment requiring maximum accuracy in logging. Equipped with real vernier, reading to 1/10 division. Easy and simple to mount.

LEVER-TYPE INDICATOR Type J



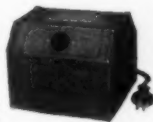
For transmitter-panel use. Bake-lite knob and handle. Nickel plated brass pointer. 6" diameter etched scale can also be furnished. Available for 1/4" and 3/8" shafts. Details on request.



Transmitting CONDENSERS—Model TM

Widely used by the U. S. Government, Broadcasting Stations and amateur transmitters the world over. Made in 3000 and 6000 volt ratings and in capacities from .000035 to .00045 Mfd. Other voltages and capacities made to special order. Now supplied with Crolite insulation.

THE POWER UNIT



A separate unit with cable and soft rubber covered connecting plug, especially designed for humless operation of high-frequency receivers. 180 Volt B, 2.5 Volt filament supply. Licensed under R.C.A. Patents.

NATIONAL

Precision-Built RADIO—PARTS

NATIONAL COMPANY INC., SHERMAN, ABBOTT & JACKSON STS., MALDEN, MASS.

Say You Saw It in QST — It Identifies You and Helps QST

Ah, that Figure¹!

TO BE found in most every *QST* article, and it takes your eye to the bottom of the page to refer to some past issue or issues of *QST*.

Obviously the reference is there for a real and helpful purpose.

You can always check—and double-check—what has been written on the subject treated if you keep your copies in a

QST Binder



Note the wire fasteners. Unnecessary to mutilate copies. Opens and lies flat in any position.

\$1.50 each
postpaid

A binder will keep your *QST*s always together and protect them for future use. And it's a good-looking binder, too.

QST

1711 Park St., Hartford, Conn.

and a fine proof of the friendly spirit of our government.

Much interest is being shown in our General Meeting and Convention, which will be held at Oslo on August 9th and 10th this year.

SWEDISH NOTES

By Goran Kruse, Vice-President S.S.A.

To secure closer coöperation between our members and the headquarters, and also between members in the same localities, we have started an organization with District Leaders (DL's) similar to section communication managers, who are elected for a term of two years. The election took place in March, with the following results:

For Districts 1, 2, and 3: G. Eklund, SM2YK
" District 4: B. Linderholm, SM4XX
" " 5: B. Arvidson, SM5RH
" " 6: J. F. Karlsson, SM6UA
" " 7: S. Malmberg, SM7RV

The organization has already been helpful, and we expect much of it during the coming season, when we hope to arrange contests between districts, and similar activities.

Our members are still mostly using low-powered outfits, with a medium input of about 20 watts. One of the few higher-powered stations is our "Grand Old Man," SM6UA, who by this time is probably known to most amateurs in the world for his unfailing enthusiasm and skill in spite of his age, which is over 60. At his home on Orust there are always amateurs to be found during the summer, enjoying his hospitality. Thus, G6YL is visiting old "UA" during August.

A number of short-wave tests on trains have been made recently in Sweden, there being no commercial radio on the trains in this country. The results with simple arrangements have been astoundingly good, although reception is always difficult when the train is moving. The most successful test was made by four amateurs from SM5UX, the Technical University at Stockholm. They maintained a reliable QSO with a Norwegian station at a distance of 700 km. with an input of 4 watts to a Hartley oscillator, using an antenna of 12 meters hung up inside the wagon. The signals from this train station travelling in the middle of Sweden were also reported R3 from the Swedish ship, XSM4Z1, at 1400 km. distance. Tests with small portable apparatus on autos, motorboats, and motorcycles are also very popular among our amateurs at present in spite of the very poor radio conditions prevailing this year.

When 28 mc. was good in February and March several SM's were active on that band. The most successful station was SM6WL, who worked EAR and FM with 10 watts input, getting good QRK's. No W stations have, as far as is known, been heard in Sweden on this band, but FM, SU, YI, and ZS come in very strongly when Father Heaviseide permits! SM6WL is also a good QRP-station, having made the WAC Club with 10 watts in a short time.

RCA RADIOTRON UV-872

A hot-cathode, mercury-vapor rectifier

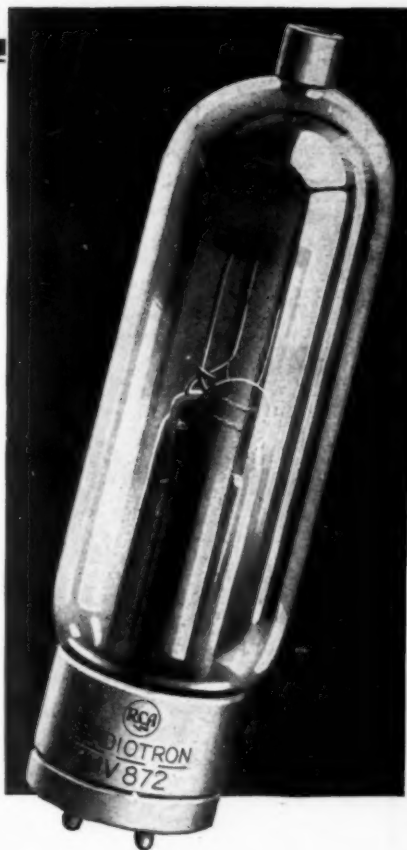
THIS new Radiotron is capable of supplying to the amateur transmitter a rectified current larger than that obtainable from any rectifier Radiotron hitherto used by amateurs. Because it has more than four times the rectified current capacity of the well-known UX-866, amateurs will be more than pleased with its reserve of power.

Like the UX-866, Radiotron UV-872 possesses a low and practically constant voltage drop which insures a stable source of plate voltage—full load or no load.

The strength built into its simple structure, the low temperature at which its rugged, coated-ribbon filament operates, the extremely low voltage drop resulting from its composite design—all these are contributory factors to the remarkable performance amateurs will experience from Radiotron UV-872.

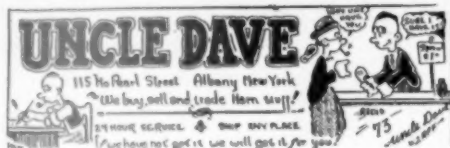
We will be pleased to send our instruction book on this tube to any interested amateur. Kindly send your call letters when writing.

RCA VICTOR COMPANY, INC.
ENGINEERING PRODUCTS DIVISION
CAMDEN NEW JERSEY



Filament Volts	.	.	5
Filament Amps.	.	.	10
Max. Peak Inverse Volts	.	.	5000
Max. Peak Plate Amps.	.	.	2.5
Approx. Tube Voltage Drop (Volts)	.	.	15
Max. Overall Length	.	.	8 1/2"
Max. Overall Diameter	.	.	2 5/16"

Price \$22⁵⁰



Special for This Month

Power Crystals, anywhere in the 3500 K.C. band....	\$5.25
Dustproof bakelite holders.....	1.50
Crystal blanks, unfinished.....	1.75
Finished oscillating crystal blanks.....	2.75
Calibrated Monitors, built for three uses: Oscillator, Monitor, and frequency meter. These are individually calibrated and are checked against Piezo oscillators, net.....	9.35
with batteries and three coils for 20, 40 and 80 meters.	
Wave Meter for 20, 40 and 80 meter band with individual charts, complete with external loop, indicator and coils.....	6.25
Dongan power transformers, 300 watt 1000 volt each side of center and with following voltages: 3 C.T., 10 C.T. and 10 and 20 volt Not C.T. Fully mounted. Weight 14 pounds.....	5.95
Ward Leonard 10,000-ohm 50-watt trans. leaks.....	.50
5000-ohm leaks.....	.39
New Universal double button microphones, model BB, net.....	16.50
Model KK, net.....	32.50
Microphone cases, special.....	2.25
New Sprague 8 mfd 430-volt electrolytic condensers.....	1.40
New Mersham 18 mfd electrolytic condensers.....	2.00
Flechtheim 1 mfd 1500-volt por. ins. Cond.....	2.49
Flechtheim 2 mfd 1500-volt por. ins. Cond.....	4.50
Flechtheim 4 mfd 1500-volt por. ins. Cond.....	7.00
Rectobulbs mercury vapor R-81 type, Just out, new, list \$7.00; special.....	4.50
Rectobulbs mercury vapor R-3 type, net postpaid.....	10.00
Slightly used R.C.A. U.V. 211 or 203A's, guar.....	17.00
Slightly used Western Electric 212D tubes, guar.....	35.00
Slightly used Western Electric 50 watters, guar.....	15.00
Slightly used R.C.A. U.X. 851 1000 watters, guar.....	175.00
R.C.A. U.X. 240 HiMu tubes.....	1.00
New Allen-Bradley 500-watt radiostat.....	5.50
National Var. Condenser .00045-3000-volt with velvet vernier dials.....	9.50
New CeCo 230 2-volt 199 type. Non Microphonic.....	1.25
New CeCo 231 2-volt 120 type. Non Microphonic.....	1.25
New CeCo 232 2-volt screen grid D.C.....	1.90
U. S. Navy 5 watters CG 1162, new.....	.65
Sangamo .00025, .0005, .002, .001, 5000-volt condensers.....	1.20
Used U.X. 852 tube, guaranteed.....	20.00
R.F. chokes for receiver and transmitter.....	.50
Enameled No. 12 aerial wire. One hundred feet.....	.90
Two hundred feet. Coils.....	1.65
Weston Galvanometers, new unboxed, model 375.....	5.75
Weston Model 425, Thermo milliammeters, 0-125 or 0-250 mills.....	7.00
Weston current squared thermo galvanometer, 0-100 model 425.....	7.50
Aluminum No. 14 C.P. wire. Per ft.....	.01
Microphone stands, adjustable floor model, brass parts adjustable to 78 inches.....	9.25
Microphone stands, table model, brass constructions.....	4.25
50-watt sockets.....	.95
250-watt sockets for 212D tube.....	3.50
204A — 250-watt sockets, set.....	1.95
General Radio Decade box.....	15.00
U.X. 281 Tested and functioning.....	.85
Latest Amateur Call books.....	.85
Western Electric 205D tubes, new original cartons.....	3.50
R.E.L. wavemeters list at \$22.00. Special.....	15.00

Include postage with all orders and 20% deposit against C.O.D. shipments

Moved to larger quarters. Visit our radio shack when in town. Good time assured

What have you for sale or trade?

We carry everything for the Ham
MORE FOREIGN TRADE SOLICITED

Write for free Ham sheet

UNCLE DAVE'S RADIO SHACK

115 North Pearl Street, Albany, New York

Phone 45746

Many SM's are hampered with BCL-QRM as crystal sets are still widely used here, and the Telegraph Administration is very drastic in cases of interference, prohibiting all transmission during BC time.

For some time we have been using the abbreviation "RDI" in Sweden as a substitute for the old QRV. Meaning "ready," it is built up like "sri," and we would like to have the opinion of amateurs in other countries on this practice.

Since 1927, S.S.A. has been transmitting a weekly radio-news-bulletin in Swedish. This broadcast now takes place at 0900 G.C.T. every Sunday. The general call for S.S.A. members, SM9SA, is being used, and reports of reception of the broadcast are very welcome

DUTCH EAST INDIES

By Egb. A. Krygsman, Sec'y Treas. N.I.V.I.R.A.

The future of amateur radio here does not look particularly bright, since the government refuses to promise anything definite in the way of legislation, but advises us to wait and be patient. Our expectations of what will happen when something is eventually done are far from optimistic, but in the meantime we are doing all we can and hoping for the best.

The Indies are very beautiful, and offer splendid opportunities for amateur radio. A wide archipelago, with many small islands, is covered



ANOTHER STATION FROM CHINA IS VS6AE, PAT J. O'BRIEN, OF HONGKONG

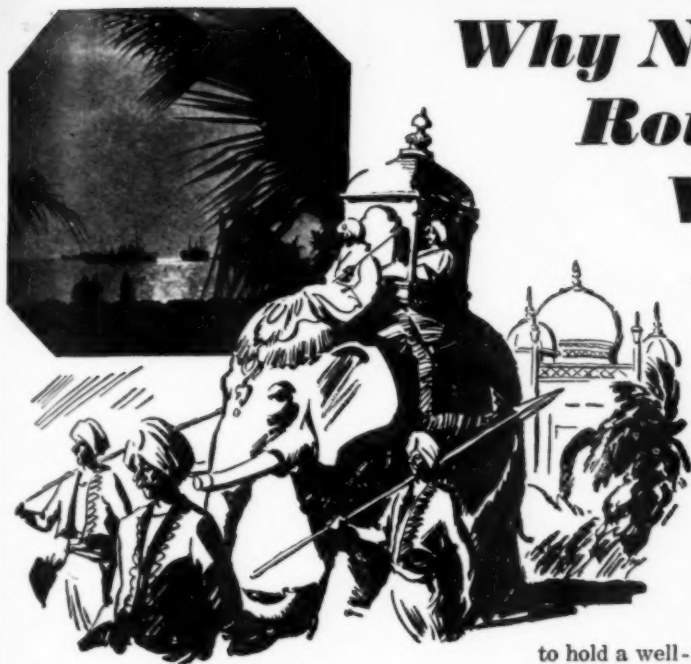
Ten watts input at 250 v. is fed the CX-310 Hartley oscillator. The radiator is a voltage-fed Hertz.

by a net of amateur operators. They bring the most lonesome places in contact with the outside world, and replace modern life among the workers.

The government has ordered 3.5-mc. 'phone stations for their very lonesome posts, to bring their officers nearer to the Government offices. Thus they gather the power into their own hands.

The constitution of the N.I.V.I.R.A. is an exact copy of that of the N.V.I.R. in Holland, reproduced with their permission, with not one clause altered.

The many troubles in our Union have brought us new members to replace the old ones who have



Why Not Go Round the World . . .

Let
RADIO
Pay Your
Way

RADIO needs more men like you today . . . positions now open for "radio fans" who want to get somewhere in radio . . . men who think radio . . . who are radio minded . . . men who play and work at radio. Why not use the knowledge you already have as a stepping stone to success in radio? All you need is the practical up-to-the-minute training that RCA gives you. RCA Institutes actually trains you for success in radio . . . you learn under the direction of RCA experts. You get the practical as well as the theoretical knowledge . . . the "how" as well as the "why" of radio. You, too, can make good in radio . . . so, why not start today!

*A Commercial Radio License
Can Easily Be Yours*

The entire radio world needs trained men NOW. On ship and shore the demand is constant. Large broadcasting stations, manufacturers, dealers, as well as steamship companies are continually asking for men who have the knowledge and the confidence

For the added convenience of students who prefer a Resident Study Course, for class room instruction, RCA Institutes, Inc., has established Resident Schools in the following Cities:
New York . . . 75 Varick St.
Boston, Mass. . . 899 Boylston St.
Philadelphia, Pa. . . 1211 Chestnut St.
Baltimore, Md. . . 1215 N. Charles St.
Newark, N. J. . . 560 Broad St.
Chicago, Ill. . . 222 North Bank Drive
Home Study graduates may also attend any one of our resident schools for post-graduate instruction at no extra charge.

to hold a well-paid position in Radio. You, too, can now get that knowledge . . . You can be trained for a good paying radio job.

RCA is the world's largest radio organization. It sets the standards for the entire radio industry. And the RCA Institutes' home-laboratory training course enables you to learn the secrets of radio quickly. It enables you to obtain a thorough, practical education in radio in your spare time . . . You get the inside information, too, because you study right at the source of radio achievement. You learn radio by actual experience with the remarkable outlay of apparatus given to every student.

*See For Yourself Why RCA Graduates
Earn Big Money in Radio*

Clip this coupon now . . . send for this free book. Or, if you wish, step in at one of our resident schools and see for yourself how RCA Institutes actually prepares men for success in radio. Come in and get this free book or send

for it by mail. Everything you want to know about radio. Each page packed with pictures and descriptions about the amazing opportunities in this vast, world-wide, money-making profession.

Clip this Coupon NOW!

RCA INSTITUTES, INC.

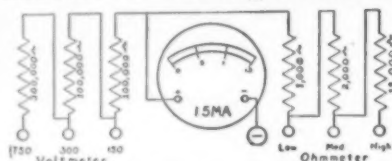
A Division of Radio Corporation of America



RCA INSTITUTES, Inc.
Dept. QST-10, 75 Varick St., New York
Gentlemen: Please send me your FREE 40-page book which illustrates the brilliant opportunities in Radio and describes your laboratory method of instruction at home!

Name.....
Address.....

Measure Easily Resistance-Voltage-Current



Super Akra-Ohm wire-wound Resistors and Shunts afford an inexpensive means to build test equipment for the measurement of resistance, voltage, and current with accuracy. A combination for the measurement of voltages and resistances is shown in the above diagram.

Super Akra-Ohm wire-wound Resistors are manufactured in any value from 100 ohms to 10 megohms. They are carefully designed to insure an accuracy of one per cent and a constant permanency of calibration. Their use is highly recommended for Laboratory Standards, High Voltage Regulators, Telephone Equipment, Television Amplifiers, Grid and Plate Resistors, Electrical Apparatus, and Test Equipment, etc.



Prices range from \$1.25 for 100 ohms
to \$4.00 for 500,000 ohms

Send us your dealer's or jobber's name
and we will send you a copy of **Bulletin 73-C**
containing complete information regarding the conversion
of milliammeters into multi-range ohmmeters, multi-range
voltmeters, and multi-range milliammeters.



ALUMINUM BOX SHIELDS

Beautiful Silver Dip Finish

Frequency Meter Box 7" x 10" x 14" \$5.45
Monitor Size 6" x 10" x 10" 3.25
Stage Shields 5" x 6" x 9" 1.89
1 1/4" plug-in forms, 44 grooves to the inch, either UX or UY
prongs, for nat new tuner, only 49c
65 ohm resistors, to use 250 type tubes on 6 volts, 29c
Neon Test Lamp, 100 to 550 volts, indicates polarity, \$1.00.
.001 Variable Condenser, \$1.25 Please include postage.
BLAN, THE RADIO MAN, INC.

89V Cortlandt Street New York City

STANDARD QRH CRYSTALS

Power Type Crystals	Power Type Crystals	Power Type Crystals
\$10.00	\$10.00	\$15.00

1700-Kc. band 3500-Kc. band 7000-Kc. band
Guaranteed—easy oscillators, carefully selected for maximum output, and ground to your approximate frequency. Accurately calibrated within one-tenth of one per cent of frequency delivered. Crystal Holders \$3.00.

Precision Piezo Crystals for
BROADCAST BAND; AIRCRAFT AND
COMMERCIAL RADIO CORPORATIONS:
from 14000-Kc. to 15-Kc. With temperature
ranging from 23 degrees centigrade to 50 degrees
centigrade. Temperature control units. Prices on
request. (Precision crystals checked against a
30-Kc. standard.)

Standard QRH Crystal Laboratories
37-64 83rd Street
Jackson Heights New York, N. Y

left us. Many of the old ones have remained faithful, and we now have a membership of 109. This is not at all bad, but it is very hard to get the contributions in. We have forty very good members; these are the old-timers.

The Board of Directors has been reorganized, with the new members elected forming the old guard of the N.I.V.I.R.A. They are as follows:

President: A. J. A. Schoevers, PK2AJ
Vice-President: A. J. H. L. Rosenquist, PK1JR
Secretary-Treasurer and Communications Manager: Egb. A. Krygsman, PK6AQ

All correspondence, including QSL cards, should be sent to the Secretary at the following address: c/o Bataafsche Petrol Co., Boela, Ceram, D. E. I.

The N.I.V.I.R.A. would appreciate greatly corresponding with other foreign amateur organizations, and make arrangements for tests, and similar activities. We would be grateful for any communications concerning this.

The most outstanding feature of the past year is the DX work with our friends at home. Many of our stations worked PA stations. The most contacts were made by PK4AZ and PK1JR.

28 mc. has been the order of the day, but results have been negative to date. PK1BH and PK4AU kept things going in fine style, and we can hardly blame them for at last coming to the conclusion that fading affects 10-meter signals at this time of year, and giving 28 mc. a rest for a while.

We are in the habit of receiving publications from other amateur organizations, but would like to have more. We will surely appreciate it very much if the radio clubs will send us their papers.

14 mc. is improving, and the 1930-31 season should see the PK's drifting down to this excellent DX band.

High Frequency Notes

(Continued from page 26)

We bring to a fitting climax the shrouded reports of the 28-mc. tests with the following report:

"I wish to report that during the A.R.R.L. 28-mc. tests no 28-mc. signals were heard.

"Weather conditions in Shanghai during the days of the tests were bad and, in light of past experience, it was not expected that any signals would be heard." — F. Rodman, XU2UU.

We cannot help from commenting at this time on the splendid spirit in which these and other reports were sent in. In not a single case was the person begrudging the lack of results; in fact quite the reverse was the air. In nearly all cases the experimenters were clamoring for more information, tests and good wishes. It is just that spirit which has dominated the amateur each and every time that a new and harder job has been cut out for him. It is from experience that we

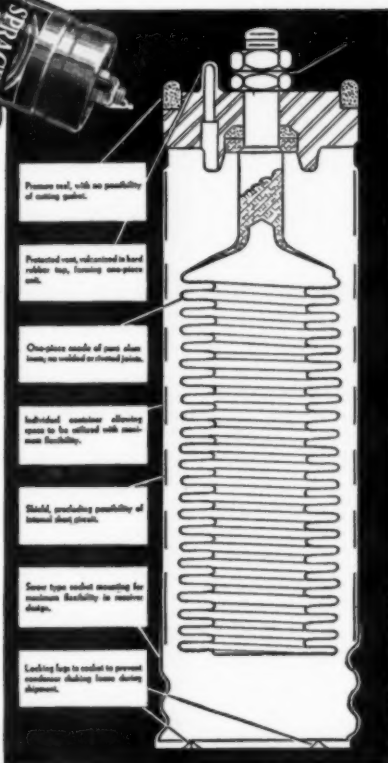


Put It Up to the SPRAGUE Condenser

OUR specialty is solving condenser problems thru the Sprague Electrolytic Condenser. At your service is 8 MFD capacity, with a rating of 430 DC — boiled down to a space only $1\frac{1}{8}$ " diameter by $4\frac{1}{8}$ " high. And packed with mechanical and electrolytic superiorities that make it the outstanding condenser today. The one-piece round-edged anode is absolutely free from all soldered or welded joints. The protected rubber vent (integral with the top) makes liquid leakage impossible. The individual container of standardized size enables the Sprague to easily fit into any receiver design. And a screw-type socket mounting renders attachment in any position a matter of seconds only.

Write for illustrated folder showing how the Sprague electrolytic condenser will solve your condenser troubles speedily at the lowest cost

SPRAGUE SPECIALTIES COMPANY
Manufacturers also of the well-known
SPRAGUE PAPER CONDENSER
North Adams, Mass.

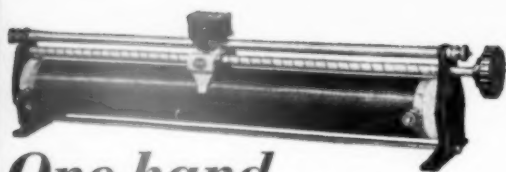


SPRAGUE

Electrolytic

CONDENSER

*Capacity 8 MFD
Peak Voltage 430 DC
Can Negative*



One hand . .



slides the shoe . . or . . turns the screw in this Newer, Better RHEOSTAT

GRASPING the slider knob with *one hand* automatically disengages the screw selector mechanism, for rapid adjustment of the new HH Tubular Rheostat. Release of grasp restores the screw engagement as soon as the screw knob is turned—and again *one hand* quickly selects the desired turn. The phosphor bronze contact shoe will not tear the wire. There is no binding. The pressure springs carry no current; they cannot lose their resiliency through overheating.

Here is a logical application of sound engineering principles to rheostat design. Have us send full details on types, capacities and prices.

**TUBULAR
HH RHEOSTATS**

HARDWICK, HINDLE, INC.
218 Emmet St., Newark, N. J.



MICROPHONES

EVERY SIZE AND PRICE FOR
EVERY POSSIBLE USE
Also Accessories and Repairs

Dealers everywhere

Universal Microphone Co., Ltd.
Inglewood, Calif.

**Every Licensed Amateur Needs
the New**

A. R. R. L. Log Book

See Inside Back Cover This Issue

ATTENTION!

Amateurs all over the country are saving money by dealing with us. By paying the postage we save you additional money.

All our merchandise is of the highest quality and **NEW**, no seconds or used apparatus in our store.

Bakelite Tubing $\frac{1}{4}$ " to 4" dia.
Falmestock Clips
Aluminum Sheets Cut to Size
Magnet Wire — Call Books

Complete Lines of

Aero, Aerovox, Bradley, Cardwell, DeForest, Durham, Ellis, Feron, Flechtheim, Frost, Hammarlund, Hand Books, Jewell, Knox, Munzig, National, Ohmite, Pilot, Pyrex, R. E. L., Readrite, Samson, Sangamo Signal, Thordanson, Universal, Wright de Coster, Vaxley.

CATALOGUE FREE

Let us put you on our mailing list

218 Chestnut
Street

HALL'S

Quality Apparatus

Harrisburg
Pa.

learn our lessons. And with the results of the June 28-mc. tests reported we want to say that we are planning future experiments here at Hq. on frequencies above 56 mc. As soon as any results are collaborated they will be reported immediately within these pages, and shall need every bit of coöperation that can be secured.

All those who did not digest the 56-mc. lead article in September *QST* had better get the facts as soon as possible and become "high-frequency minded."

"Beep" Phelps, W2BP has worked W2NM on 56-mc. phone.

Please report all results on work on 28-mc. and above to A.R.R.L. Hq. with time of day and weather conditions noted. This is most important for we have several contradictory reports and it is impossible to definitely draw conclusions until results are "checked and double-checked."

How Our Signals Look

(Continued from page 30)

remains constant in spite of the modulation in one, while in the other it varies "all over the lot." Again I repeat: "Wobulation" is the cause of broad waves.

As soon as the amateur wakes up to the fact that he must do something to sharpen up his wave and to smooth it out, the sooner will the QRM decrease. At the present time the screen-grid tube used as a dynatron oscillator for frequency control in an m.o.p.a. circuit offers intriguing possibilities to the amateur; and I believe that the time will soon come when we will all have steady, clear, notes.

When time permits I intend to solve the problem of why a sixth district station can always be identified before he signs, just by his note, no matter what kind of plate supply he is using. To some extent this applies to the Australian and New Zealand stations also, and when good weather comes around I hope to make some pictures of a few DX waves.

I wish to express my appreciation to Dr. Lee Edward Travis for the help he has given me and the facilities extended to me.

Silent Keys

It is with deep regret that we record the passing of these amateurs:

Walter Stevens, W1BOK, Norway, Maine.
L. R. Gravette, Fort Worth, Texas.
J. Ross Day, W9CNI, Vincennes, Ind.
William Gaffery, W6DTS, Merced, Calif.
Frederick E. Van Stone, W6EVB, San Fernando, Calif.
Lester Picker, W6ZH, Hollywood, Calif.

Leeds Listening MONITOR



For checking your note, its stability and whether D.C. or not. **THE ONLY SURE CHECK.** Gives you an accurate idea as to what your signal sounds like to the other fellow. The Leeds Monitor is encased in an aluminum shield, 5" x 6" x 9" overall. Completely shielded, with batteries self contained. Supplied with A. & B. batteries, but without 1-UX. 199 tube.

Special **\$15.00**

Make your own transmitting and receiving coils. Copper tubing transmitting inductance.

Inside Dia.	3/16"	1/4"	5/16"
2 1/8"	9c	10c	12c
2 3/8"	9c	10c	15c
3 1/8"	10c	12c	17c

Prices per turn

Thordarson B-Eliminator Transformer **\$1.65**

Thordarson 150 watt Transformer. Limited quantity — over 1000 sold at \$3.95, for specifications see previous issues — a few left at **\$3.50**

Leeds 50 watt socket specially priced. See previous issues of QST for details.

LEEDS

The Home of RADIO
**45 VESEY STREET
NEW YORK**

**New York's Headquarters
for
Transmitting Apparatus
When in Town Visit Our Store**

EVERYTHING IN
ACME JEWELL PYREX
BRADLEY FLERON
THORDARSON
ELECTRAD NATIONAL
LYNCH SIGNAL
FLECHTHEIM
NATIONAL RECTOBULB
GENERAL RADIO
CARDWELL

IN STOCK

Leeds Microphone STANDS



Beautiful oxidized copper finish. Very sturdy construction. Artistically designed, effective appearance.

Desk Type, Price..... **\$4.75**

Floor Type, Adjustable to 7 feet. Price..... **\$9.75**



NEON GLOW LAMPS

Made by General Electric Co., type G. 10, standard base, 101 uses, as illustrated in QST May issue page 17. Price only **.65c**

Standard electric socket for tube..... **.15c**

WIRE

No. 14 Enamel 3/4c Foot
No. 12 " 1c "
No. 10 " 1 1/2c "
Any length up to 1000 feet

DUBILIER HIGH VOLTAGE FILTER CONDENSER



4 MFD. D.C. Working Voltage 600 V

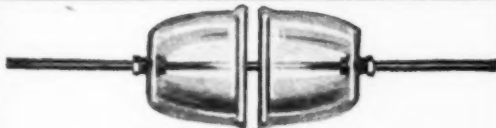
These Filter Condensers are designed for use in filter circuits in Transmitters, and all high Voltage Socket power devices and Power Packs.

TYPE PL 571

List Price **\$7.25**

Several thousand sold at \$2.25, the balance at.....

\$1.80



Special LEEDS lead in bowls made of Pyrex. Two cups size 3 1/4" dia. x 2 1/4" high; supplied complete with 18" brass rod and hardware. Price **\$2.25**

Larger size cups 6" dia. x 4 1/4" high; complete set two cups, hardware and 24" brass rod. Price complete..... **4.25**

LEEDS RADIO LABORATORIES

Precision Custom Built Short Wave Receivers and Transmitters

This department under the supervision of the Short-Wave Specialist, Jerome Gross. We design, construct and advise on any material for the "Ham" Broadcasting station or laboratory. Write Jerry Gross for advice on any of your problems.

G. R. No. 557 Short Wave Condenser



Covers 75 to 85 meter band. Condenser consists of 6 stator plates, 2 rotor plates of the straight line wave-length type and 2 additional rotor plates which are complete circular discs. Min. capacity 43 MMF to 70 MMF maximum; size 4" x 4" x 4 1/4" for panel mounting only. Price **\$3.25**.

FILTER CHOKE



30 Henry, 150 Mill — special heavy choke, good for filter circuits for transmitters up to and including one UX852, or as a modulation choke on medium power transmitters. Specially priced at **\$3.25**



Hardwick, Hindle Bleeder Resistors

and Grid Leaks. For Sizes and Prices see Sept. Q. S. T.

Complete line of the following
Nationally advertised products

AEROVOX

**Cardwell
NATIONAL
VIBROPLEX**

PLEASE PRINT YOUR NAME AND
ADDRESS PLAINLY TO AVOID DELAY

WRITE FOR
SPECIAL PRICE LIST

MAIL ORDERS FILLED SAME DAY
10% Cash Must Accompany All C. O. D. Orders

Have You Seen Our Radio Bargain Bulletin No. 31?

Here Are a Few of the Items It Contains:

POWER TRANSFORMERS

THORDARSON High Voltage Power Transformers.
250 Watts — for 2-UX-250 or 210 and 2-UX-281 Tubes. **\$5.75**
THORDARSON High Voltage Power Transformer.
175 Watts — for 1-UX-250 or 210 and 2-UX-281 Tubes. **\$4.25**
R.C.A. Power Transformer, for UV224 Screen Grid and UX245 Power Tubes, Type 380. **\$3.75**
R.C.A. Power Transformer No. 8335, For Radiolas 33-18-17, Supplies plate and Filament Voltages for 4-226's, 1-227 and 1-171A and 280 Tubes. **\$3.75**
THORDARSON Sonora Power Transformers. Supplies plate and filament voltages to 4-224's, 1-227, 2-245's and 1-280 Tubes, used in B 31-33 and 35 sets. **\$3.75**

FILTER CONDENSERS

DUBILIER 11 1/4 Mfd. High Voltage Filter Condenser Block, D.C. Working Voltage 1000, 600 and 160. **\$3.75**
DUBILIER 4 Mfd. High Voltage Filter Condenser Block, D.C. Working Voltage 600. **\$1.80**
AEROVOX 7 Mfd. High Voltage Filter Condenser Block, D.C. Working Voltages 1000, 800 and 400. **\$3.25**
POTTER 13 Mfd. High Voltage Filter Condenser Block, D.C. Working Voltage 600. **\$4.25**

FILTER CHOKES

THORDARSON Double Filter Chokes, Model T-2458, Contains two 18 Henry 250 Mill Chokes. **\$6.25**
FELTER Chokes, 30 Henries — 120 Mills. **\$2.00**
R.C.A. Double Filter Chokes, No. 8336, Contains two 30 Henry 100 Mill Chokes. **\$2.50**
THORDARSON 30 Henry — 150 Mill Choke, Model T-2030A. **\$3.25**
BRADLEYSTATS Type E210. **\$1.95**

MISCELLANEOUS

KOLSTER — K-5 — Electro-Dynamic Speaker, complete with 210 or 250 Power Amplifier and "B" Supply Unit. List \$175.00, (less tubes). **\$26.50**
GOULD Kathode Unipower 6-Volt Automatic Radio, "A" Power from light socket. **\$9.75**
WESTERN ELECTRIC Breast Type Microphone. **\$1.25**
KOLSTER 6-H Console Receiver with built-in Dynamic Speaker, List \$295.00 (less tubes). **\$42.50**
POWERIZER for Radiola 28 and 25, List \$84.00, (less tubes). **\$21.00**
G.E. 1B-1 Kenotron Rectifying Tube. **\$5.50**
SAMSON "Pam" No. 16, Two-Stage Power Amplifier (less tubes). **\$38.50**
BREMER-TULLY Model 80 Six-Tube Battery Operated Console Receiver, fully shielded, one dial control, List \$89.50 (less tubes). **\$24.50**
R.C.A. Two-Stage Audio Transformer Pack Part No. 5667, For Radiolas 33, 18 and 17, Ratio of each Transformer 3-1. **\$1.90**
JEFFERSON Step-Down Transformer, 110 V. to 14 V. at 2 1/2 Amps. **\$5.95**

AMERICAN SALES CO.

19-21 Warren Street, New York City



All You Need to Learn TELEGRAPHY

Morse or Continental
with **Teleplex**

Learn Telegraphy—the world's most fascinating profession—by hearing real messages—sending them. Interesting—simple—you learn quickly—at HOME.

Teleplex is the Master Teacher. Used by U. S. Army, Navy and leading radio and telegraph Schools. Write for Folder Q-10.

TELEPLEX COMPANY
76 Cortlandt Street, New York

Election Notices

(Continued from page 34)

York City; New England, Mr. Frederick Best, W1BIG, Augusta, Me.; Northwestern, Mr. K. W. Weingarten, W7BG, Tacoma; Roanoke, Mr. W. Tredway Gravely, W3BZ, Danville, Va.; Rocky Mountain, Mr. Paul M. Segal, W9EEA, Denver; West Gulf, Mr. Frank M. Corlett, W5ZC, Dallas.

5. These elections are the constitutional opportunity for members to put the man of their choice in office as the representative of their Division. Members are urged to take the initiative and file nominating petitions immediately.

For the Board of Directors:

K. B. WARNER, Secretary.

Hartford, Conn., 1 August 1930.

To all A.R.R.L. Members residing in the MIDWEST DIVISION:

1. Mr. Louis R. Huber, W9DOA, A.R.R.L. Director from the Midwest Division, has resigned as Director because of removal from the Midwest Division, the resignation to take effect upon the election of a successor.

2. You are hereby notified that a special election is about to be held in your Division, in accordance with the Constitution, to elect a successor to Mr. Huber for the unexpired remainder of his 1930-1931 term. This special election will be held in the month of November, 1930, concurrently with the regular elections above notified to occur in certain other Divisions. All of the governing details above notified as applying in other Divisions apply to the special election in the Midwest Division except that the term of office is the remainder of the 1930-1931 term.

3. Nominating petitions, complying with the governing details above referred to, are hereby solicited. The following form for nomination is suggested:

(Place and date)

Executive Committee,
American Radio Relay League,
Hartford, Conn.

Gentlemen:

We, the undersigned members of the A.R.R.L. residing in the Midwest Division, hereby nominate of as a candidate for Director from this Division for the unexpired remainder of the 1930-1931 term of L. R. Huber.

(Signatures and addresses)

Members are urged to take the initiative and file nominating petitions immediately.

For the Board of Directors:

K. B. WARNER, Secretary

Hartford, Conn., 6 August 1930.

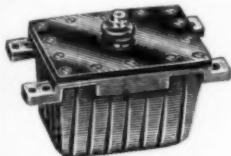
Strays

General Order No. 89 of the Federal Radio Commission, effective May 1, 1930, requires all applications for renewal of station license to be filed so as to be received at the offices of the proper Supervisor of Radio at least thirty days prior to the expiration date of the license.

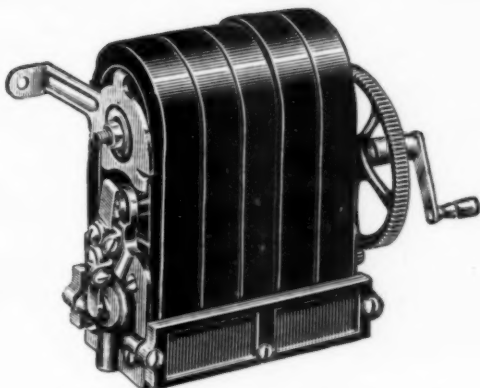
BARGAINS ARMY AND NAVY RADIO SURPLUS



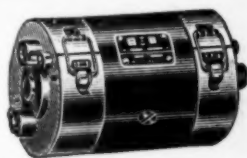
Magnavox anti-noise microphone, good for home broadcasting.....\$1.50



Condensers, Mica, op. volts
12,500 cap. .004.....\$17.50
Dubilier, new.....15.00
Wireless spec. New.....15.00
Wire spec. Used.....12.50



Magnet-Generator, 5 bar type, new surplus army equipment, very powerful, excellent test set.....\$3.50



NEW LOW PRICE
Dynamotor 32/350 volt, ball bearing, 80 mills. Special \$9.00. Per pair.....\$15.00



EDISON NON-SPILL Storage Battery Cells
Type M-8, 1.2 volts, 4 1/2 amp, never used, per cell.....\$1.50
Type A-4, 1.2 volts, 150 amp, first class, nickel alkali, \$3.50
Type A-6, 1.2 volts, 225 amp, nickel alkali.....\$4.00

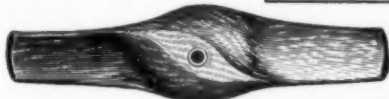


Lightning Switch, High Grade W.E. Heavy Copper Blade and Contacts. Size 7 x 8 x 6 high. While they last.....\$3.50



Western Electric Fixed Condenser 21 AA — 1 MFD., 1000 volts A. C. Test. Ideal filter condenser for low power transmitters, fully guaranteed, excellent value.....\$1.00

AT LAST—Genuine Western Electric Hand Microphone Home Broadcaster. \$3.50 used, \$5.00 new.



Propeller, wood, 15" long, 2" wide, 2" pitch, 9/16" bore.....\$1.00
Prop, aluminum, auto speed regulating (Deslauriers), 20" long, 3" wide, 1" to 2 1/4" pitch, 9/16" bore.....\$4.00



Ammeter, R.F., 0-10 amp, zero adjuster. 4 in. diameter. A real buy at.....\$4.50

Switchboard, 8 line portable Western Electric, magneto ringing; dry cell talking circuit; 8 drops, 26 anti-capacity 12 to 16 terminal key switches, regular price \$175.00, special.....	\$30.00
Switches, W.E., taggle, anti-capacity platinum contacts, 12 terminals, special.....	.95
Sounders, telegraph 20 ohm.....	2.50
Sounders, Western Electric 900 ohm.....	3.50
Oscillators, navy radio freq. "Drivers" 5,000-30,000 meters, regular price \$100.00, Special.....	25.00
Generator, 1 K.W. Navy Gen. Elect., input 24 volt, output 1000 volt at 1 amp. with shaft and pulley, wonderful value.....	75.00
Motors 1-30 H.P. back geared 110 A.C. variable speed, auto reversible (Socony oil burner type) has over one thousand uses, a very good buy. Regular price \$35.00.....	7.50
Rheostats vitrohmm, variable Ward Leonard, 500 ohm .2 to 1.5 amp. 35 tap field reg. type.....	5.00
Rheostat, vitrohmm, variable, Ward Leonard, 6 ohm 15-5 amp. bat. charge type.....	3.50
Resistors, vitrohmm Ward Leonard, with leads, ans. sizes per doz.....	1.50
Relays 2 and 5 kw. (110 or 220 volt) 3/4 silver contacts.....	7.50
Relay West. Elec. low voltage, 2 upper and 3 lower platinum point screws, 3 contact arms.....	5.00
Extra platinum contact screws or arms.....	.35
Amplifier, W.E. Radiophone, C.W. 926, 3 Stage.....	15.00
Heterodyne, Signal Corps, type B.C. 104, 1000 to 3000 meters, with detector.....	15.00
Air compressors, Kellogg, Model T. 1 1/2 cu. ft. per min. weight 6 lbs., 600 R.P.M., 125-lb. Requires 1/4 h.p.....	3.00
SPECIAL — U. S. Army instruction book on telephony or telegraphy. Hundreds of pictures and diagrams.....	1.00
Microphone, Army Trench, sensitive.....	1.50

Charging Board, 32 volt, complete with Weston No. 269 voltmeter 0-50, auto cutout resistances, switches, etc., on slate base. \$60 value.....	\$15.00
Generator, airplane, Signal corps, with shaft, can be used as motor, 12 volt 33.6 amps. 5000 R.P.M.....	10.00
Generators, 12 volt, 60 amp, has automatic controls.....	20.00
West. Elec. switchbd. control panel for above dynamotors, has switches, 0-50-500 voltmeter, complete filter system, etc. Special.....	8.00
Ammeters, D.C. portable, new Weston model 45, 3 scale 0-1.5-15-150 with 3 scale external shunt and leads 1/4 of 1% accurate.....	40.00
Ammeter, Weston No. 425 thermo-couple 0-2 amp., mtd. on large bakelite base with D.P. hi voltage switch.....	7.50
Ammeter 50-0-50, Watghaz, B.T. flush mtg.....	.75
Ampere hour meter, Sangamo, battery charge and discharge, type MS 0-500 scale, capacity 15 amp.....	10.00
Milliammeter, Westinghouse, 0-150 surface mtg., b. con.....	5.00
Motor generator, Crocker Wheeler or Holtzer Cabot, 110 D.C. 220 A.C., 500 watt, 500 cycle. Ball bearing.....	50.00
Complete line 500 cycle motor generators 1/4 to 5 K.W. Transformers, General Electric, 125 to 2500, with primary center tap, 60 cycle, 200 watt.....	7.50
Transformer, Amertran, oil immersed, 1 K.W., 500 cycle, 220/8000 volt.....	10.00
Condensers, transmitting, Murdock .002 mfd. 12,000 volt, ideal for plate blocking.....	2.50
Condenser, Dubilier, mica, op. volts 8500 cap. .004.....	10.00
Headphones, West. Electric No. 194W same as C.W. 834, 2200 ohms, D.C. slightly used, Navy type.....	5.00
Holtzer Cabot, "Mike" Utah type carbon granular transmitter, Special.....	.95
Western Electric Radiophone Transmitter unit, 326W.....	1.50
Dynamotor, aircraft 32/275 volt, with shaft.....	10.00
NAVY Dynamotors General Electric 24/1500 volt. 233 mills. (Extended Shaft — \$3.00 extra).....	37.50
New spare armatures, G.E. 24/1500 volts.....	12.50

Largest Radio and Electric Supply House in U. S. Specializing on Army and Navy Surplus. Write us your particular requirements. Sufficient postage and deposit of 20% required on C.O.D. orders.
NO C.O.D. ON CANADIAN ORDERS. DUE TO LIMITED GOV'T SURPLUS WE DO NOT ISSUE CATALOGS.
MANHATTAN ELECTRIC BARGAIN HOUSE, Dept. Q, 105-7 Fulton St., New York City

Say You Saw It in QST — It Identifies You and Helps QST

SEND FOR NEW 1931

Radio and Electrical Wholesale Trade Catalog

IT IS FREE

Royal-Eastern's New 1931 General Wholesale Trade Catalog has been compiled to place before you a most comprehensive line of high-grade nationally advertised merchandise, at lowest wholesale prices.

Every worth-while radio, electrical and sporting goods item is featured at lowest wholesale prices. Being the largest radio and electrical mail order house in the East, we can serve you best. We buy no seconds. We have no job lots. Only fresh and clean products in original factory cartons.

Same day shipping service — and, Royal-Eastern never substitutes.

With our large warehouses and a background of thirty-three years of service to the trade, we are in a position to render the same service to you as has been our custom in the past.

Official authorized headquarters for New Hammarlund HIQ31, Silver-Marshall and Pilot Products.

BEST CREDIT RATING!

Our Banking Affiliations and Depositories

The National City Bank of New York, N. Y.
Irving Trust Co., New York, N. Y.
Brooklyn National Bank, Brooklyn, N. Y.
Bank of Manhattan, Long Island City, N. Y.
Huguenot Trust Co., New Rochelle, N. Y.

33 Years
Service to
the Trade

Send for Catalog Today!

IT'S FREE!

33 Years
Service to
the Trade

Royal-Eastern Electrical Supply Company

16-18 West 22nd Street, New York, N. Y.

Branch Warehouses:

Brooklyn, N. Y. Long Island City, N. Y.
New Rochelle, N. Y.

It's EASY to Get a HANDBOOK

(Sixth Edition)

DIRECTIONS:

Realizing that Handbook must be had, proceed as follows:

- (1) Fill out below, tear off.
- (2) Reach in pocket, produce U. S. A. \$1 bill, old or new size (we don't care).
- (3) Clip together, mail us.

Handbook Factory,
1711 Park, Hartford.

SEND IT AT ONCE.

(Name)

(Street or P. O. Box)

(City and State)

Standard Frequency System News

(Continued from page 38)

intended particularly for European amateurs and starts at 2100 G.C.T. Schedules BX are transmitted especially for amateurs in Oceania and the Far East. They are transmitted starting at 1000 G.C.T. by W9XAM and at 1200 G.C.T. by W6X-. Reports on these special schedules are particularly desired, not only from overseas hams but from those in the Americas also.

Although the frequencies of the transmitting stations are not guaranteed as to accuracy, every effort is made to keep to within 0.01% of the announced frequencies. The station standards are calibrated from the National Frequency Standard at the Bureau of Standards, Washington, D. C. Frequent checks on the transmissions are made by laboratories equipped with accurate frequency standards and the transmissions are also checked by the U. S. Department of Commerce monitoring stations.

TRANSMITTING PROCEDURE

The time allotted to each transmission is 8 minutes, divided as follows:

2 minutes — QST QST QST de (station call letters).

3 minutes — Characteristic letter of station, interrupted by call letters. Characteristic letter of W1XP is "G", of W9XAM is "D", and of W6X- is "F".

1 minute — Statement of frequency in kilocycles and announcement of next frequency.

2 minutes — Time allowed to change to next frequency.

THE TRANSMITTING STATIONS

W1XP: Massachusetts Institute of Technology, Round Hill Research, South Dartmouth, Mass. Howard A. Chinn in charge.

W9XAM: Elgin Observatory, Elgin National Watch Co., Elgin, Ill., Frank D. Urie in charge.

W6X-: Don Lee Broadcasting System, Los Angeles, Calif. Harold Peery in charge.

Do not forget to QSL the transmissions. All reports should be sent to the A.R.R.L. Standard Frequency System, 1711 Park Street, Hartford, Conn. A record will be made at Headquarters and the report will be then forwarded to the proper station. S. F. report blanks can be obtained from Headquarters, free and postpaid, upon request.

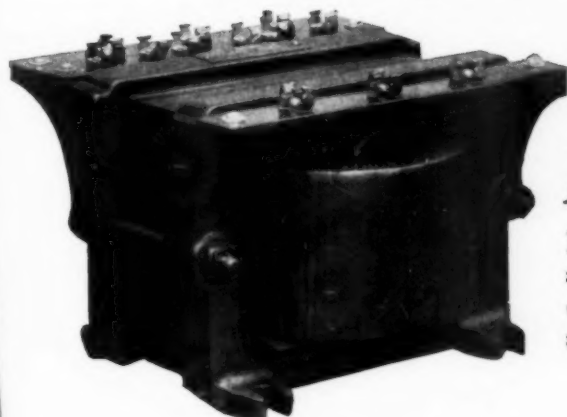
— J. J. L.

West Gulf Division Convention

Houston, Texas, October 10th-11th

WELL, fellows, we are all set for you, and we hope to make this fourth annual convention of the West Gulf Division go down into history as the biggest thing ever pulled off in the division. So, the Houston Amateur Radio Club extends to you all a cordial invitation

AMERTRAN



Equipment

Designed to meet the new amateur requirements of an adequately filtered D. C. current supply.

Filament Heating Transformers

Voltage regulation within 5%. Note insulation test voltage.

Type	V. A.	Cycles	Line Volts	Sec. Volts	Sec. Amps.	Test Voltage	Type Tube
H-4648	12½	50/60	200/230	2.5/1.25	5	12,000	—66
H-66A	25	50/60	100/115	2.5/1.25	10	12,000	—66
H-4649	37½	50/60	200/230	2.5/1.25	15	12,000	—66
H-4650	50	50/60	100/115	5/2.5	10	12,000	—72
H-4651	50	50/60	200/230	5/2.5	10	12,000	—72
H-4652	100	50/60	100/115	5/2.5	20	12,000	—72
H-4653	150	50/60	200/230	5/2.5	30	12,000	—72

Plate Transformers

P-4656	290/415	50/60	100/108 115/125	2360 1180	O.175	6,000	two 211 two 845
--------	---------	-------	--------------------	--------------	-------	-------	--------------------

The above Plate Transformer is designed to deliver 1000 volts D. C. with the average filter. Other Plate Transformers can be furnished upon receipt of specifications giving your requirements.

Radio Filter and Modulation Chokes

Type No.	Inductance (Henries)	Amperes (D. C.)	D. C. Resistance (ohms)	Insulation Test (volts)	Use
4725	8	0.250	65	2500	Filter
557A	15	0.250	130	2500	Filter
4618	70	0.050 to 0.200	410	5000	Modulation

Other standard size Choke Coils available for transmitting circuits.

Amertran Radio Parts have long been recognized as the highest quality. Amateurs obtaining the best results realize their value.

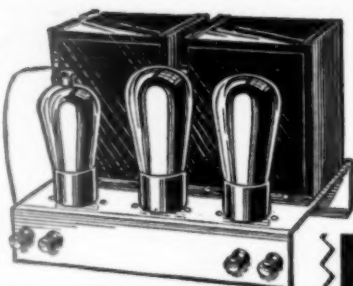
Write for Bulletin No. 1066.



**AMERICAN
TRANSFORMER COMPANY**
172 Emmet Street
Newark, N. J.

Say You Saw It in QST — It Identifies You and Helps QST

Licensed
under
Loftin-
White
and
R. C. A.
Patents



Build Your LOFTIN-WHITE

Direct-Coupled **AMPLIFIER**
with the
Approved **ELECTRAD KIT**

The Electrad-Loftin-White A-245 Amplifier Kit provides assured performance of the revolutionary L-W Direct-Coupled System recently perfected by Edward Loftin and S. Young White. Includes all parts, except tubes, including drilled metal chassis, assembly and operating instructions. For A.C. operation, using one '24, one '45, and one '60 tube. \$35.00.

If your dealer can't supply you, write us. Address Dept. Q 10 for descriptive literature

175 Varick Street, New York, N. Y.

ELECTRAD

INC.

NEW! NEW! NEW!

LAFAYETTE

Wide World
**SHORT-WAVE
RECEIVER**

It's here! Perfect short-wave reception with the new Lafayette Wide World Short Wave Receiver. A. C. Push-pull amplification. Double Screen Grid. 9 to 550 metres. Absolutely guaranteed. Fully wired, complete with power unit, at a sensationally low price. Write for full particulars TODAY.

MANY OTHER BARGAINS

Wholesale Radio Service Company, the reliability house of radio, is featuring short wave apparatus of known quality. Write for our 1931 Radio Catalog—"the guide book of radio quality"—sent absolutely FREE. It's yours for the asking!

WHOLESALE RADIO SERVICE CO. INC.
36 VESEY ST. Dept. 5421 NEW YORK

to come to our affair. The registration will take place at the Rice Hotel, Houston, Texas, Friday morning, October 10th. Radio Supervisor Deiler will be present to give examinations for those who wish to take them. A big barbecue will be given Friday noon by W5AEA. Mr. F. E. Handy, Communications Manager, will be A.R.R.L. official representative, and besides his official work will give us a good talk on a Dynatron Frequency Meter. Professor Waters of Rice Institute and Ed. Zimmerman, Radio Engineer, will have something good for the phone fellows. There are several others whom you will enjoy. Notwithstanding all the good talks, we intend to have plenty of entertainment for all—a boat ride on the *Nicholas* down the Ship Channel to Galveston Bay; music and dancing on board. The big banquet will be at the San Jacinto Inn and there will be plenty of food and a first-class floor show in charge of Tex Lynn, "the boy with the whistling blues," and the award of prizes finally. There you are! If you miss this convention you will be sorry. All aboard for Houston! Let me know, fellows: Robert E. Franklin, 1806 Valentine St., Houston, Texas.

Pacific Division Convention

Sacramento, Calif., October 17th-18th

ALL ABOARD for Sacramento! The Sacramento Valley Amateur Radio Club, under whose auspices the Eleventh Annual Pacific Division is to be held, extends a cordial invitation to all amateurs to attend this annual affair. An extensive program has been prepared and every effort will be made to give those who attend their money's worth.

First of all the registration fee has been set at \$4.00, and will cover all attractions including the banquet, boat ride, etc. The good ship "Static" will sail down the Sacramento River. There will be a smoker and stunts on board on Friday evening; that boat trip will be worth the price of the convention alone. A trip through the local railroad shops, which are said to be the second largest in the United States, will be made; a parade through the city streets and a trip to a local park, where races and other amusing contests will be held. The guest of honor will be F. E. Handy, Communications Manager.

The registration headquarters will be at the Hotel Land, at 10th and K Streets. Special rates have been arranged for and by doubling up in rooms, rates as low as \$1.25 per night may be obtained.

Good prizes have already been donated, and the Committee reports that an award of a complete transmitter, ready to operate, will be made; but the details of this transmitter are a dark secret and will not be divulged until the winner receives it. The Wouff Hong trophy from the Modesto Radio Club will be awarded at this convention.

And so, there you are, fellows—everything lined up. All that is needed to make the convention a success is your presence.

Two Way Radio Link Never Interrupted — Capt. Yancey's Radio Makes New Records —

Here's the Story behind These Headlines

The Yancey plane (ESCO equipped) in its non-stop flight to Bermuda maintained direct two way communication with New York. Darkness forced the plane down a little short of its goal. The plane floating on the sea remained in communication with New York.

Later, on its "Good Will" flight to South America the Yancey plane, on the ground at the Canal Zone, maintained two way communication with New York. Zeh Bouck, Radio Operator, said—"I believe this is without doubt a record for Airplane transmission, and it shows very clearly what we could have done had we been forced down in some of the jungle over which we have flown during the last few weeks."

And on July 1, this last record was broken — the Yancey plane, on the ground at Buenos Aires, communicated uninterruptedly for more than an hour with the New York Times Station, 5838 miles away.

The Yancey plane was equipped with an "ESCO" wind driven generator to supply radio power while flying, and a battery operated "ESCO" dynamotor for ground work.

"ESCO" has a very complete line of wind driven generators, and dynamotors for airplane service. Let "ESCO" Engineers help you with your power supply for communications.



Type NA Airplane Generator

**ELECTRIC  SPECIALTY
COMPANY**

225 SOUTH ST.

STAMFORD, CONN.

Manufacturers of motors, generators, dynamotors and rotary converters

Massachusetts Radio and Telegraph School

18 Boylston Street, Boston

Send for Catalogue

Tel. Hancock 8184

Established 1905

ELLIS MICROPHONES



MODEL 20N
\$45.00
List Price

Models 20N and 30N, \$75.00 list. Approved by every high grade Amplifier Manufacturer in the country. Used by Broadcast Stations and Public Address Systems everywhere. Complete line of stands, cords, etc. Write for descriptive literature and name of nearest jobber.

ELLIS ELECTRICAL LABORATORY

337 W. Madison St.

Chicago, Illinois

H I L E T

announces new split modulation choke 30 and 30 Henry — 160 MA, 14 lb., \$8.50. Other adjustable Gap. Chokes — 100 H, 80 MA, 21 lb., \$12.00, 60 H, 160 MA, 22 lb., \$12.00, 30 H, 320 MA, 27 lb., \$14.00, 20 H, 500 MA, 32 lb., \$18.00, 15 H, 4000 MA, 22 lb., \$12.00, 20 H, 1000 MA, 190 lb., \$48.00, 30 H, 1000 MA, 225 lb., \$58.00, 20 H, 1500 MA, 240 lb., \$68.00, 30 H, 1500 MA, 290 lb., \$78.00, 20 H, 2000 MA, 310 lb., \$98.00, 30 H, 2000 MA, 350 lb., \$120.00. Transformers, 750 watt, 1500-1850 each side, \$19.50, 500 watt, 1000-1500 each side, \$15.00, 250 watt, 500-750-1000 each side, \$10.50, 150 watt, 325-375 each side, \$9.00. Filament — any voltage, tapped primary, \$6.50. Specials to order. Prices are mounted with leads. For Deluxe model with fuse and terminals add \$3.50.

One Day delivery

HILET ENGINEERING CO., Orange, N. J.



LIST \$7.50

GENUINE UX-216-B RECTIFYING TUBES

These tubes are the genuine RCA UX-216-B Rectifying Tubes. Filament: $7\frac{1}{2}$ volts at $1\frac{1}{4}$ amps. Normal input rating is 550 volts. However, tubes will safely stand a peak voltage of 1000 volts. Two tubes may be used for full wave rectification.

This is a favorite tube for the "Ham" as it is equipped with the long life, well-known rugged "XL" Filament.

Besides being used for transmitting, it is also used in radio receivers where high voltage rectification is required.

Every tube brand new, guaranteed and packed in original cartons.

EXTRA SPECIAL **\$2.35**

AMERICAN SALES CO. 19-21 Warren Street New York City

Say You Saw It in QST — It Identifies You and Helps QST

RECTOBULBS

Type R3 for the transmitter: Mercury Vapor Hot Cathode, indirectly heated: standard filament voltage of 10 volts: durable and trouble free when used within specified limits:

Plate voltage.....	3000
Filament volts.....	10
Maximum Plate load (Mils)...	250
Inverse peak maximum.....	7000
Drop per tube 15 volts at full load	

Type R81 to replace standard UX281 Rectifier tubes: a wonder for the heavy duty amplifier and small transmitter.

Plate volts.....	750
Filament volts.....	7.5
Plate mils.....	150
Drop per tube 10 volts full load.	

Specialists on Tube Reconditioning. We invite you to use our Service.

Try our N65 Screen Grid Buffer and Amplifier tube.

Priced low for the Ham \$12.50

All products and reconditioning fully guaranteed against defects

NATIONAL RADIO TUBE CO.
3420 18th Street San Francisco, Calif.



Do You want to be a High Class Radio Operator?

You can be a Clear, Fast Sender, able to work with the best of them. You can be a Rapid, Accurate Receiver, able to copy the fast

stuff with pen or typewriter. The Successful Methods used by the fastest and highest paid Radiomen are taught to you in

The Candler System of High-Speed Telegraphing

It is a Post Course of intensive training for developing Receiving and Sending Speed quickly through Scientific Methods (not trick theories). It trains the Brain, Muscles and Nerves to Co-ordinate in doing fast, accurate work. It develops the power of Concentration; gives you Confidence by making you sure of yourself at all times. No matter what your speed now is, we guarantee to increase it.

In big land stations and on ships at sea are successful operators who have taken and are taking the Candler System. "I owe my speed (55 wpm) to your System." — Theo. McElroy, World's Champion. "Can copy fast stuff 3 to 5 words behind easily. Radio-Typing Course is best for radiomen." — Raymond H. Bell, U.S.S. Idaho. Thousands of letters like these pour into our offices from all over the world. There's no substitute for the Candler System of High-Speed Telegraphing.

If you want to get out of the "slow class" and do something, write for further information about this great Course and what it has done for over 45,000 operators. Give your present speed and tell us what you want to accomplish. Also ask about Radio-Typing Course.

The CANDLER SYSTEM CO.
Dept. RL.
6343 South Kedzie Avenue Chicago, Illinois

Come along, and let Wm. H. Yeaw, W6UM, R. D. 4, Box 4605, Sacramento, Calif., know that you will be there.

Financial Statement

By order of the Board of Directors the following statement of the income and disbursements of the American Radio Relay League for the second quarter of 1930 is published for the information of the membership.

K. B. WARNER, Secretary.

STATEMENT OF REVENUE AND EXPENSES FOR THE THREE MONTHS ENDED JUNE 30, 1930

REVENUE			
Advertising sales, QST.....	\$16,211.80		
Newsdealer sales.....	10,614.15		
Handbook sales.....	4,550.51		
Membership dues.....	8,118.55		
Miscellaneous receipts.....	803.66		
Emblems.....	188.76		
Interest earned.....	302.54		
Cash discounts earned.....	335.44		
Bad debts recovered.....	2.74		
Beginners booklet sales.....	363.77	\$41,491.92	
Deduct:			
Returns and allowances.....	\$3,762.83		
Less portion charged to reserve for newsdealer returns.....	37.57		
	3,725.26		
Cash discounts on sales.....	296.75		
Exchange and collection charges..	3.05	4,025.06	
Net revenue.....		\$37,466.86	

EXPENSES			
Publication expenses, QST.....	\$12,134.77		
Publication expenses, Handbook..	1,804.41		
Salaries.....	17,001.96		
Forwarding expenses.....	679.84		
Telephone, telegraph and postage	1,886.63		
Office supplies and general expenses.....	2,597.91		
Rent, light and heat.....	942.01		
Traveling expenses.....	1,513.43		
Depreciation on furniture and equipment.....	497.75		
Communications Department field expenses.....	34.65		
Headquarters station expenses...	101.24		
Total expenses.....		39,194.60	
Net loss from operations....		\$1,727.74	

Book Reviews

By Jas. J. Lamb, Tech. Ed.

Riding the Air Waves, by Eric Palmer, Jr. Published by Horace Liveright, New York. 329 pages. Price, \$2.00.

The autobiography of an amateur who had his license cancelled (at his parents' request) because he slipped up on his school-work, who subsequently almost went on an expedition, and who amassed a lot of notoriety in the process. It makes interesting reading for the fellow who stayed at home.

BEFORE

AND

AFTER



**The Service Man's
Visit With**

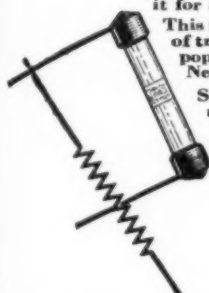


The Resistor Replacement Guide

With the purchase of 10 Durham Metallized Resistors (until November 15th, 1930) you receive our complete Resistor Replacement Guide free; or you may buy it for 50c.

This remarkable booklet shows clearly and concisely: (1) how to locate cause of trouble in radio sets, (2) proper types and values of resistors to use in all popular types of radio receivers manufactured in years 1927, 1928, 1929. Never before were radio men offered such a complete guide for service work.

Send your order today for 10 resistors—or send 50c—and get this valuable Guide now.



DURHAM
Metallized
RESISTORS



INTERNATIONAL RESISTANCE COMPANY - 2006 Chestnut St., Philadelphia, Pa.

"No Other Resistor Has All of Metallized's Advantages"

Metallized Resistors are used by the largest radio manufacturers, and more are used by service men than any other make.

PACENT Duo Lateral COILS

Radio engineers and laboratories with real records of accomplishment use Pacent Duo Lateral Coils. They come in all standard turn ratios.



Write for information
and prices

PACENT ELECTRIC CO., INC.
91 Seventh Avenue New York City

Do you know that the latest Handy and Hull Handbook is available in bound form — \$2.00 per copy, postpaid.

When ordering a copy of this new sixth edition, look at your present copy and determine if you want your next copy in more permanent form.

QUARTZ OSCILLATING CRYSTALS

Scientifically Prepared for Maximum Power and Unconditionally Guaranteed 1 in. square sections, (close to your specified frequency), supplied promptly at the following prices:

75-100 meters	\$12.50
100-200 meters	9.00
200-600 meters	15.00
1 in. Tested blanks, 200-400, 400-600 meters	4.00
Dustproof Bakelite mounts	3.00

(A Calibration furnished with each crystal)
Sections of any practicable dimensions made to order
(Charges for grinding to exact frequencies given on request)

J. T. Rooney, B. Sc., 4 Calumet Bldg., Buffalo, New York
"A pioneer crystal grinder"



A CONDENSER MICROPHONE

for the Amateur and Experimenter

\$75.00

Complete with 3 tested tubes, 5-ft. shielded cord and standard 5-prong plug and stand as shown. This is a special model we have developed. It embodies the same high quality and precision as our public address and broadcast station Microphones. The output level is well above the level of the best carbon types. No background noises. Unusual fidelity. Low upkeep cost. This item is priced net to the user and is sold on a money back satisfaction guaranteed basis. Order from this ad or write for further information.

ASTATIC MICROPHONE LABORATORY

Type AX3P
21 Olive Street, Youngstown, Ohio

Say You Saw It in QST — It Identifies You and Helps QST

QST Oscillating Crystals

"THE STANDARD OF COMPARISON"

AMATEUR BANDS:

Winter is coming, and no doubt you are going over your transmitter removing those weak links so as to get the most possible efficiency from your set.

One item of great importance is the frequency stability of your set. Does it stay on one frequency? If not, our power crystals will solve that problem. SCIENTIFIC RADIO SERVICE crystals are known to be the best obtainable, having ONE single frequency and highest output. With each crystal is furnished an accurate calibration guaranteed to better than a tenth of 1%. New prices for grinding power crystals in the amateur bands are as follows:

1715 to 2000 Kc band.....\$15.00 (unmounted)
3500 to 4000 Kc band.....\$20.00 (unmounted)
7000 to 7300 Kc band.....\$40.00 (unmounted)

BROADCAST BAND:

Power crystals ground in the 550-1500 Kc band accurate to plus or minus 500 cycles of your specified frequency fully mounted for \$55.00. In ordering please specify type tube, plate voltage and operating

temperature. All crystals absolutely guaranteed regards to output and frequency and delivery can be made within two days after receipt of your order.

CONSTANT TEMPERATURE HEATER UNITS:

We can supply heater units guaranteed to keep the temperature of the crystals constant to better than a tenth of 1 degree centigrade for \$300.00. Two matched crystals, ground to your assigned frequency in the 550-1500 Kc band with the heater unit complete \$410.00. More detailed description of this unit sent upon request.

ATTENTION AIRCRAFT AND COMMERCIAL RADIO CORPORATIONS:

We invite your inquiries regarding your crystal needs for Radio use. We will be glad to quote special prices for POWER crystals in quantity lots. We have been grinding power crystals for over seven years, being pioneers in this specialized field, we feel we can be of real service to you. We can grind power crystals to your specified frequency accurate to plus or minus .03%. All crystals guaranteed and prompt deliveries can be made. A trial will convince you.

SCIENTIFIC RADIO SERVICE

"THE CRYSTAL SPECIALISTS"

P. O. Box 86

Dept. P-12

Mount Rainier, Maryland

TRANSMISSION CONDENSERS



Send for interesting data and price sheet on Transmission Condensers with working voltages up to 3000 D.C. for use with the following tubes: 203A, 204A, 210, 500W, 851, 852, 860, 865.

CORNELL ELECTRIC MFG. CO.
Long Island City New York

TRANSFORMERS

Guaranteed — Mounted — Complete
1 KVA 3 phase 1500-2000 v. each side\$40.00
700 watt 1000 — 1500 each side\$15.50
250 watt 500 — 750 — 1000 each side
unmounted \$10.00; mounted \$11.50
Auto-Transformers, Chokes, Polyphase and 25-cycle
Transformers. Add \$2.00 for fil. winding
WENCES FRANK GREBEN
1927 So. Peoria Street, Pilsen Sta. Chicago, Ill.

BUY THAT PART NOW! RADIO BARGAINS

Get ready for the new season properly. The biggest and best sale ever offered. The lowest prices on record.

EXTRA SPECIAL — DONGAN 250 watt transformers — Completely shielded and mounted in a metal case. Line ballast tube for absolutely steady voltage regulation. Terminal lugs at top for connection. Secondary output is 1500 volts c.t. at 750 volts. Filaments: 15, 7½, 7½ c.t., 2½ c.t. They are selling like wildfire. Limited quantity left. **ONLY \$6.50 each.**

KNIGHT 150 watt transformers. High voltage secondary of 600 volts. Two 7½ c.t. windings for 281 and 210 tubes. 1½, and 2½ volt windings also furnished. Ideal for half-wave rectification systems for power to a 210 tube. Going fast at the reduced price of — \$2.75 each.

TUBES — The best on the market at these prices. Our thirty-day guarantee of free replacement is your guarantee that these tubes are really first class tubes at extraordinarily low prices. Type X281 — \$1.60. X250 — \$2.15. X210 — \$2.05. For the high powered set we have the "buy of the century." VTX 866 mercury vapor rectifier tube — \$7.50.

VTX — 852 75 watt tubes — \$23.50. There is also a very liberal guarantee on the 866 and 852 tubes, which are constructed to stand under the heaviest working conditions.

R.C.A. — Victor 30 henry, 125 mill chokes. Completely shielded. Metal encased — \$1.75. COLUMBIA 30 henry 200 mill chokes. Fully mounted. A real rugged choke for heavy duty work — \$2.50.

COLUMBIA TRANSMITTING FILTER CONDENSERS. Newer and better. Insulated binding posts terminals. Guaranteed to stand up.

Capacity	Working Voltage	Price
1 mfd.	1000 " D.C.	\$1.50
2 " "	" " D.C.	2.40
4 " "	" " D.C.	3.90
1 " "	1500 v. D.C.	3.10
2 " "	" " D.C.	4.60
4 " "	" " D.C.	8.95
1 " "	2000 v. D.C.	3.95
2 " "	" " D.C.	6.95

Special Notice: The engineering department has ready for distribution wavemeters and monitors, calibrated or non-calibrated. This department is under the direction of H. Harrison, W-2ASO (ex-U2BAX), A.M.I.R.E. We will soon start the production of power supply units, power amplifiers, short wave receivers and transmitters. Write to us on any problems you may have in building your station. We will gladly help you.

FREE. The new fall issue of our catalogue is now ready. Full of the biggest radio bargains. GET IT NOW! Orders are Cash or C.O.D. ALL merchandise fully guaranteed.

Columbia Specialty Company 1038 Longwood Ave., N. Y. C.

The Ultimate Transmitter

The Best Radio Bug on the Market!

Order one of these modern instruments; increase your speed and improve your sending.



The man at the distant end will be as pleased as you will be when he copies your improved transmission.

Send for descriptive circular.

\$12.75

Remit by P.O.M.O.

ORA F. MARTIN, Radio Representative
680 N. Breese St., Route 1
BALDWIN PARK, CALIF.

TANDEM UNITS

that "check and double check"

Because they are built right in every detail Frost-Radio Tandem Units "check and double check" when you build them into a receiver. These dual controls are built in two styles: Two wire wound units or one wire wound and one carbon element unit. Each unit completely insulated from the other. Protected windings. Single hole mountings. All terminals are brought out at one side for cable wiring. Maximum resistance of each unit up to 4,500 ohms. Dissipation, each unit, 4 watts. Supplied in any combination of curves.

May We Send You Our Complete Volume Control Treatise?

A book every radio engineer should have because it was prepared by engineers to answer the kind of questions radio engineers ask. It explains why Frost-Radio wire-wound volume controls are everlastingly silent, smooth working and efficient. May we forward your copy?

HERBERT H. FROST, Inc.

Main Offices and Factory
ELKHART, INDIANA

ACME WIRE PRODUCTS

Coils — Magnet Wire Wound

Magnet Wire All Insulations
Varnished Insulations
Parvot Filter and By Pass Condensers

All products made to Recognized Commercial Standards including those of:

National Electric Mfrs. Assn.
Radio Manufacturers Assn.
American Society for Testing Materials

For more than 25 years manufacturers and suppliers to the largest and most discriminating users.

THE ACME WIRE CO.
NEW HAVEN, CONN.

Branch Offices:

New York Cleveland
52 Vanderbilt Ave. Guardian Bldg.
Chicago
842 N. Michigan Ave.

w9amr w9any w9aqs w9ary w9bex w9bhd w9bir w9bit
w9blt w9bnk w9bns w9bon w9bpg w9bre w9bry w9bce
w9ego w9egt w9ene w9eos w9eal w9eqq w9dht w9djs w9dku
w9dkr w9doc w9daf w9dsk w9dwb w9eci w9ef w9efe w9ehi
w9ehs w9emn w9eqc w9eqv w9euu w9eve w9fci w9fea
w9fjb w9fis w9fpy w9fqy w9frr w9fs w9fsw w9fta w9fun
w9gep w9gft w9gwx w9hd w9inn w9jl w9jlu w9lf w9mi
w9nj w9yc w9ych

W6ATR-W6ATT, Harold Gray, Jr., 2540 Ben-
venue Ave., Berkeley, Calif.

55k a5z a8e ac1ts ac2qy ac3bd ac8hm ac8rv au1zb celah
ce2ab ce2bf ce5aa cm8yb ena8 d1rh d8av ear8 ear16
f8axq f8bf f8er f8ex f8xz fm8rit g5aw g5by hel1g hel1m
hk1ga j2yl j3fx j4zz jes k4aan k4akv k4dk k4kd k4qk k4rf
k5dd k6acw k6alm k6avl k6bhl k6bjj k6boe k6bra k6bxw
k6ceu k6eh k6eib k6ejk k6cuq k6exo k6eye k6dju k6dqq
k6dyc k6eqm k6erh k6ero k6etf k6evv k6ewb k6ewe
k6mx k6oa k6oy k6oze k7abs k7anq k7ana k7aq k7fq
ka1af ka1au ka1ee ka1em ka1ey ka1dj ka1hr ka1re ka9pb
kdv5 kdv6 kfr5 kfu5 lul1f lul1m lu3ah lu3de lu3dh lu3fa
lu3fk lu4bi lu4da lu4dq lu9dt lu9ea nn1ne nn7ne oai1 oa4l
oa4o oa4q oa4s oa4t okina om1th om2re on4ip on4uu pylah
pylaw py1bg py1ea py1er py2ay py2bg py2ba py2ek py2ik
py2qb py2qf sa2ap ti2hv vk2aw vk2dy vk2hb vk2hm
vk2hu vk2ku vk2jv vk2jt vk2lj vk2nb vk2ns vk2oj vk2rz
vk2sg vk2vj vk2wu vk2yx vk3ax vk3bw vk3bh vk3es
vk3go vk3hk vk3jk vk3jx vk3lp vk3ot vk3pa vk3pm
vk3pp vk3pr vk3pt vk3rj vk3rm vk3ro vk3wx vk3wy
vk4am vk4aw vk4bh vk4hk vk4ks vk4kw vk4wm vk4wa
vk5bj vk5gr vk5it vk5jp vk5kj vk5os vk5wr vk6nk
vk6sa vk6wi vk7am vk7ch vk7dx vk7lj va3ab va6ah x2z
x5a x9a x7ot x29a yr3bp z53em z1aa z1as z1bb z1ba
z1fe z1fd z1ft z1fy z1fz z1zab z1zac z1zaf z1zam z1za
z1zbe z1zbg z1zfm z1zfu z1zgw z1zas z1zbb z1zbe z1zcm
z1zcp z1zet z1zua z1zuo z1zux z1zoy z1zth z1zty z1zyp
z2zn z2zm z2zu z2ud zu5c

W. A. W. Stevens, 75 Wilson St., Haver, N. Z.
3500-ke. band

k6alm vk2dp vk3ex vk3le vk6bk w1ayo w2gp w2se w3ns
w4pp w5abf w6abf w6abl w6ac w6ane w6nob w6ratm
w6avx w6awm w6ayg w6bbj w6bei w6bik w6bis w6ble
w6blh w6bne w6bme w6brk w6brn w6bun w6byh w6be
w6cej w6ecg w6erk w6dsk w6dlw w6dqv w6dsf w6ebf
w6ee w6efg w6euf w6fab w6jb w6kx w6ln w6mt w7aat
w7aip w7akh w7akv w7br w7dnx w8ey w8hd w9bi w9fa
w9fcj

7000-ke. band

aelbx g5by g6wy hel1g hh5jr ka1ey ka1dj ka1hr ka1se
k8gav k6avl k6alm k6eib k6dv k6dyc k6bqh k6ewv k6ewb
om1tb ve1dj vk2ar vk2eb vk2ej vk2dh vk2jh vk2jr vk2jt
vk2jp vk2jv vk2gr vk2gr vk2hk vk2he vk2hl vk2hu vk2kj
vk2no vk2nr vk2na vk2ow vk2ra vk2xy vk2zm vk3bg
vk3bw vk3bq vk3es vk3go vk3jp vk3lh vk3pa vk3pp vk3pt
vk3rj vk3wl vk3wo vk3wx vk3xi vk4am vk4bn vk4do
vk4hk vk4jh vk4jr vk4kh vk4wk vk5bj vk5ef vk5gr vk5hg
vk5it vk5kj vk5mb vk5wr vk6ag vk6pk va6ae vaabm
vy3am vk7ch vk7dx wfa wfat wfbt xgd w1aj w1ajq w1axv
w1bil w1kn w1mk w1za w1zi w2alu w2aof w2aps w2bjo
w2boz w2bwl w2cj w2cjj w2wx w3ant w3aao w3cav w3dh
w3hy w3mv w3ay w4agr w4ag w4al w4nn w5ain w5asq
w5ave w5bek w5nk w5ns w6ahg w6ae w6alk w6am w6ang
w6aro w6aur w6ayg w6azd w6awd w6bay w6bhe w6bhn
w6bhy w6bej w6bie w6buk w6bpm w6bzd w6bkk w6bgo
w6bqk w6byb w6bzd w6ebp w6ecp w6eak w6eal w6dii
w6dwy w6dak w6dnf w6dgy w6dpf w6dnf w6dio w6ena
w6eps w6eja w6esd w6ebg w6eri w6equ w6ja w6ky w7ae
w7aj w7anx w7apw w7bd w7be w7dd w7mo w7tu w8aaa
w8abk w8bab w8bae w8bnz w8bnt w8cv w9aab w9ahs
w9axo w9bex w9bg w9ejb w9eut w9ew w9dgs w9doq w9fgq
w9fj w9jq w9ju w9sm w9so w9um

14,000-ke. band

ae8jk ae8ls au8at celak ce5aa ct1aa f8gde hel1g j1dp
k6acw k6alm k6dpg lulea lu2aa lu9dt o24a, o24j o24l
o24q o24r o24t pk2aj pk3bm py1ah py2ay py2ba py2bg
su8rs su8ws ti2hv uoxu ouwg ve4hr vk2ak vk2av vk2aw
vk2ce vke2k vk2fp vk2gh vk2hb vk2he vk2hl vk2je vk2jt
vk2jx vk2ja vk2kj vk2lv vk2na vk2ra vk2re vk2ru vk2rx
vk2wu vk2zm vk2yk vk3ab vk3ag vk3ex vk3dg vk3dx
vk3es vk3go vk3gu vk3hk vk3lp vk3pa vk3pr vk3wp vk3zo

REPLACEMENT TRANSFORMERS by THORDARSON

R-101

Replacement Input Transformers

for push-pull tubes in output stage



T-2971-E T-3381

Replacement Power Transformers T-3381 for single "171" tube in output stage.

T-2971-E for "171" push-pull tubes in output stage.



Install Tone Quality

in unsatisfactory sets by replacing inferior, obsolete, or worn out units with THORDARSON REPLACEMENT TRANSFORMERS ... it is what the set owner hears ... the improvements in audio amplification ... that makes pleased customers.

THORDARSON Replacement Transformers are constructed according to the true high standards set by all THORDARSON apparatus ... and they are almost universal in application.

A small stock of THORDARSON Replacement Transformers enables you to recondition a wide variety of sets, with minimum investment in stock. For sale at all good Parts Dealers everywhere.

SEND TODAY for the new catalog of Replacement Power and Audio Transformers.

THORDARSON

Transformer Specialists Since 1895

Thordarson Electric Mfg. Co., Huron, Kingsbury and Larrabee Sts., Chicago, Ill.

I'LL GET BY

If you build your station to that tune you'll be lucky if your best DX is farther than "Just around the Corner." Engineer that station of yours—equip it with a power plant specifically designed for transmitter service. QST tells what you need, but where to get it? Write now for engineering data sheets describing rectifiers, power and filament transformers, reactors, built so well as to each deserve a pedestal of its own, and at which you can point with pride. RECTIFIER ENGINEERING SERVICE, 4837 Rockwood Road, Cleveland, Ohio.

U. S. NAVY SURPLUS

General Electric 24/750-volt 150-watt Dynamotors. \$27.50
General Electric 24/1500-volt 350-watt Dynamotors. \$37.50
500-watt 500-cycle generators with exciters. 7.50
Westinghouse 6-15 volt 500-watt. 15.00
Westinghouse 27.5/350-volt 80 mills. 12.50
Twins for double voltage or current. 20.00
Shafts for external drive \$3.00 additional

HENRY KIENZLE, 501 E. 84th Street, New York
Pioneer Distributor of Government Surplus
Complete list on request

BECOME A RADIO OPERATOR

See the World, Earn a Good Income,
Duties Light and Fascinating

LEARN IN THE SECOND PORT U.S.A.

Radio Inspector located here. New Orleans supplies operators for the various Gulf ports. Most logical location in the U. S. A. to come to for training.

Our students qualify for the various branches of radio. Runs to all parts of the world. Positions Ashore and Afloat. Special courses. Day and Night classes. Enroll any time. Oldest and Largest Radio School South.

Literature on request.

GULF RADIO SCHOOL

844 Howard Ave.

New Orleans, La.

Oscillating Quartz Crystals



For Commercial Stations
For Dealers
For Amateurs

POWERTYPE CRYSTALS ARE RECOGNIZED AS THE BEST

No off frequency operation with a POWERTYPE crystal

Guaranteed—easy oscillators, carefully selected for maximum output, and ground to your approximate frequency which is stated accurately to within one-tenth of one percent.

1715-2000 Kilocycle band. \$10.00

3500-4000 Kilocycle band. 15.00

One-inch oscillating blanks. 4.00

Dust-proof, plug-in Crystal Holders as illustrated below. 6.00

We also supply "POWERTYPE" crystals to broadcast and commercial stations.

With all crystal blanks we furnish grinding instructions.

This is the Powertype, plug-in, dust-proof crystal mounting now being used in hundreds of amateur and commercial stations throughout the world.



FREE

Simply send name, no obligation, for full information on crystals, holders, blanks, heater ovens, etc.

"CLEAR AS A CRYSTAL"

American Piezo Supply Company

1101 Huron Building

Kansas City, Kansas

Specialists in frequency precision

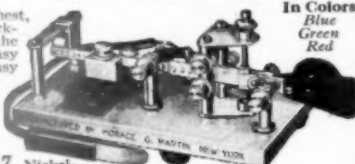
Save Your Arm !

Great

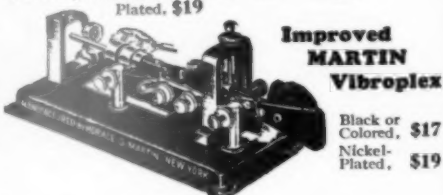
New VIBROPLEX

Reg. Trade Marks: Vibroplex; Bug; Lightning Bug

The smoothest, easiest-working bug on the market. Easy to operate. Makes sending easy.



Black or Colored, \$17. Nickel-Plated, \$19



Improved MARTIN Vibroplex

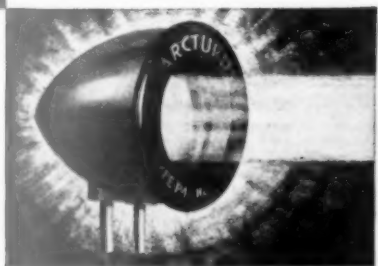
Black or Colored, \$17
Nickel-Plated, \$19

Special Martin Radio Bug — Extra large, Specially Constructed Contact Points for direct use without relay. Black or Colored, \$25

Old Vibroplex accepted as part payment
Remit by Money Order or Registered Mail
THE VIBROPLEX COMPANY, Inc.
825 Broadway, New York City
Cable Address: "VIBROPLEX" New York



Many New Uses for this Photo-Cell



Here is a new type of photo-electric cell... advanced in principle... more efficient in action. It means improved operation of every photo-electric device. Why not experiment with this improved photo cell? Send today for our FREE 40-page book, "The Photolytic Cell," and get started in the fascinating field of photo-electric research. Photo-Electric Division, Arcturus Radio Tube Co., Newark, N. J.



ARCTURUS
PHOTOLYTIC CELL
The Electric Eye for Every Industry

MADE BY THE MAKERS OF ARCTURUS BLUE TUBES

90

Say You Saw It in QST — It Identifies You and Helps QST

vk3wo vk3yw vk3zx vk4af vk4jr vk4rb vk4rj vk4rp vk5bj
vk5by vk5gr vk5it vk5ja vk5wh vk5wr vk6ag vk6tm
vk6ag vk6ah vk7ap vk7av vk7zx vk6ab vk6ay vk6bn
w7mo xu2uu

W1ABG, Al Giddis, 53 Lamb St., Lowell, Mass.
14,000-ke. band

celai ce2ab em2ay em2jm em2xd em5ni em8uf et1aa
et1ae et2ac ex1af ex2ak ear39 ear155 f8em f8ex f8hr f8klm
f8mre f8mi f8whg g2gf g2gm g5jf g5ma g6gs g6rb g6wy
helfg k4akv k4kd k4kf lu3fa lu3fk lu5ak lu9dt nj2pa
nl8mre nl8mi oa4j on4au on4ft on4gn pa0hp pylah
pylaw py1cl py2as py2ba py2fb py2bk py2bo sulwt
su8rs sm6ua ve5ao pxmg yslx

VK3RG, Gilbert Black, "Car Clew," 29 Doveton St., Castlemaine, Victoria, Australia
7000-ke. band

w1ags w1anx w1anz w1bal w1bux w1uj w2afj w2aof w2amr
w2auj w2boz w2ue w2uw w2vt w3aiy w3ajh w3anh w3ant
w3aqz w3awm w4afe w4ajh w4ajk w4et w4jh w4qv w4wz
w5aao w5aav w5afx w5ahb w5ahq w5ahx w5ajl w5aqe
w5bbe w5beb w5ma w5mv w5ql w5td w6abg w6abk w6aih
w6aix w6ahp w6am w6anl w6avq w6awf w6awy w6bet
w6bip w6bjf w6bjw w6bh w6bqk w6bpq w6bsn w6brs
w6btz w6btz w6bwi w6bwk w6bzy w6eht w6eut w6egx
w6eww w6exw w6cam w6dbd w6dev w6dgg w6dmo
w6dfw w6dtd w6dui w6dwm w6dsp w6ebn w6ebv w6ebz
w6edx w6egh w6ehp w6eke w6ekw w6eot w6epf w6eqf
w6egu w6elm w6esp w6epa w6evw w6fve w6hiv w6ju w6af
w6vt w7aax w7acd w7adg w7ag w7ajw w7amx w7ao w7bb
w7bd w7be w7be w7fh w7mh w7iy w7sl w8alu w8aup
w8axa w8baz w8bau w8brh w8cew w8duw w8dye w8dgt
w8gk w8mv w8oy w8ud w9agv w9bbg w9bga w9bce w9cdl
w9cpb w9erd w9ewx w9dgg w9dwa w9ebo w9ees w9ec
w9egu w9emr w9epv w9erm w9eve w9eet w9fbj w9fdj
w9faw w9fur w9fbv w9fpj w9giy w9gv w9lk w9me w9um
w9ww ve2ax ve5ca ve5dw kalhr kaljd kalce kalze kalcm
kalhe kalpw k6cjs k6ch k6bra k6dv k6cib j3et j3fx j3er
ae8te ae2ff ae8rv xlnq om1tb

H. MacGowan, American Club, Shanghai, China
7000-ke. band

k6ewb k6avl k6bt vk2hb vk4em vk6fl vk6wi w6ea w6byb
w6ay w6avi w6euh w6ehw w6exw w6etk w6dva w6hm
w6dm w6dep w7fh w7nb

14,000-ke. band
f8ex f8gdb oa45 vk2ks vk2jp vk2rx vk3jk jk3go vk3qh
vk6nk w6ben w6egh z1lfr altan allar z13as z13em z13aj z16x

W5LY, L. A. Walker, 1030 Kings Highway, Dallas, Texas
7000-ke. band

w1bes w1eft w1ii w1ld w1mk w2ama w2cjj w3aiy w3ana
w3atp w3aws w3cjin w3ux w4aeq w4kp w4qf w4si w6nep
w6afl w6ash w6bdd w6bhp w6bjc w6bry w6bvg w6ef
w6edo w6dij w6dww w6eb w6eep w6ekj w6ft w6ot w6sz
w7alm w7ba w7iy w7nw w7ql w7tz w7vy w8bwc w8ey
w9anx w9ece w9efq cabl em2kk em2ra em2xa em5fe
em8by em8yb hh7c kalce k4kd k6odd k6evw nj2pa tg2elo
ve2bb ve3ii ve4dj ve4dy veiho vethy ve5af z14ap

W6CTE, John Taylor, aboard S.S. "Admiral Peoples"
7000-ke. band

w1ept w1fg w2afj w2alu w2apv w2are w2wy w2byp w2cox
w2hn w2hs w2ky w3atm w3aud w3bbk w3bqz w3dr w3fj
w3kf w4abt w4aen w4ahn w4ei w4gx w4hd w4hl w4kp w4lt
w4pf w4rd w4yb w4yh w4vk w5aem w5ana w5aha w5atf
w5awa w5bjt w5bfl w5bma w5dv w5gi w5ja w5no w5pg
w5ql w8aab w8are w8aup w8bjx w8ech w8cjm w8eml
w8enr w8epf w8daq w8dsi w8tm w9aal w9bba w9beu w9bku
w9bnc w9cua w9fey w9fqy w9gdh j3er ve6ah x20a cbmt
iph wfbt k6avl k6boe k6bxw k6dud k6ewb k6nl k6no kalbe
kalce kalce kalcm kalcy kaljd kaljr kalhr kalpw kalre
vetbv vetbm vefev vefgd vefgd vk2fp vk2he vk2hg vk2nbx
vk3am vk3bw vk3bw vk3es vk3gt vk3pp vk3pr vk3rg
vk3rj vk4do vk5hg vk5wr vk6wd vk6wi z1lbn z12bz z13bb